SEPTEMBER 1959

Utility engineering section begins on page 67

Electrical South

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Serving the 18 Southern and Southwestern States

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4

Automation in industry greatly increases size of wiring contracts for electrical contractors — see page 38

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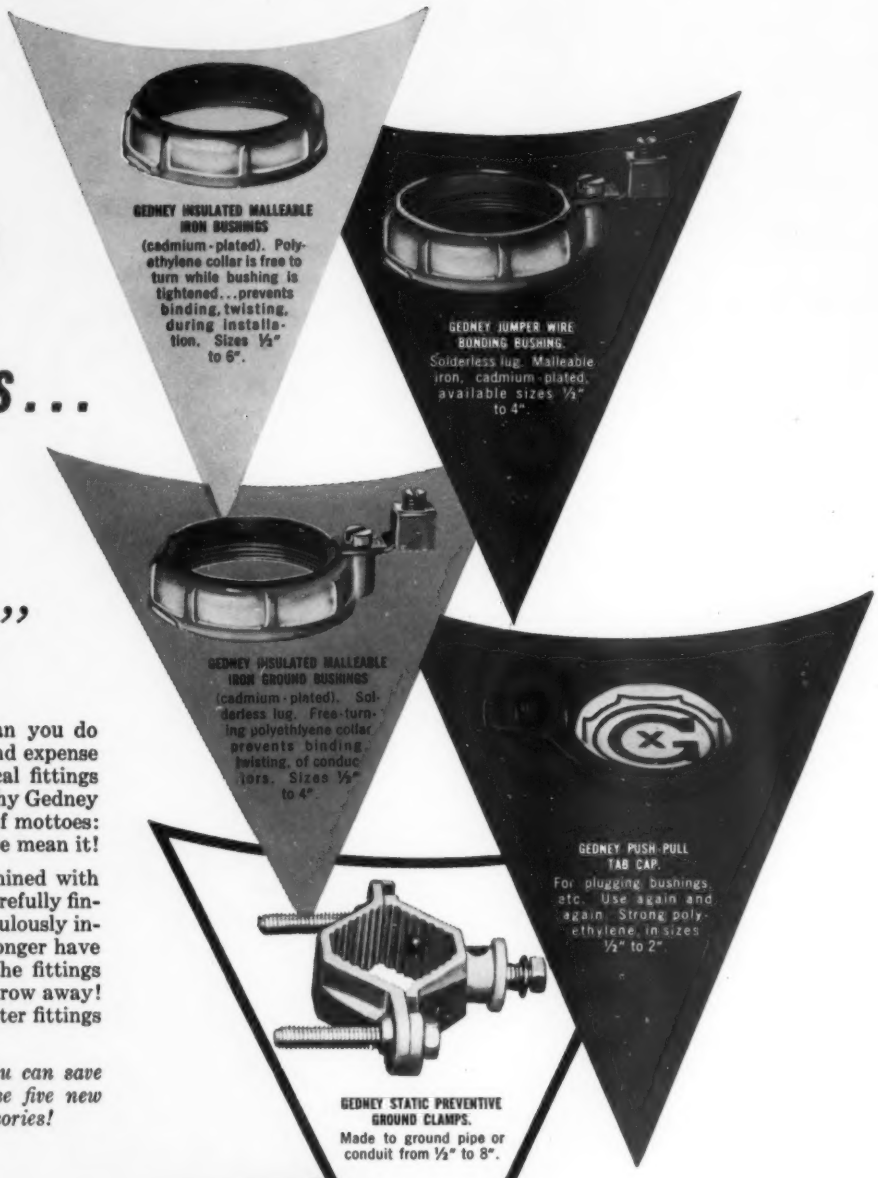

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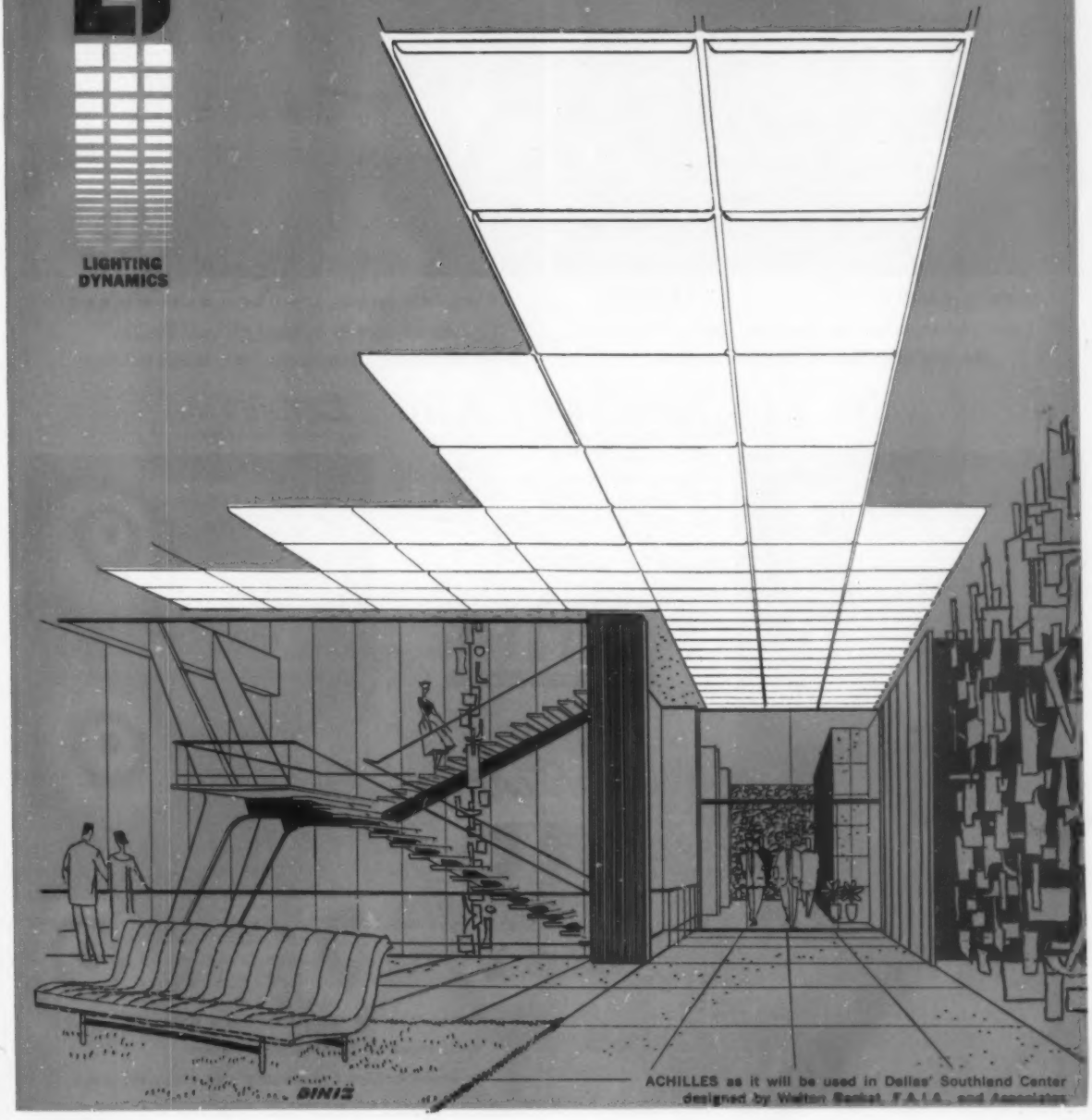

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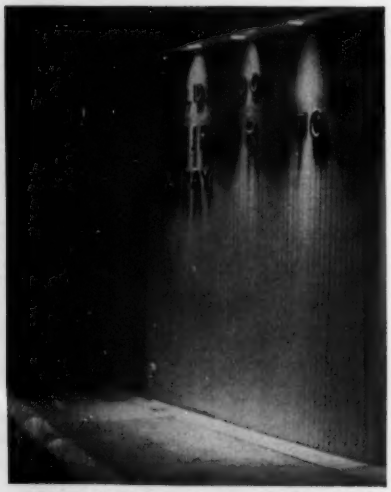

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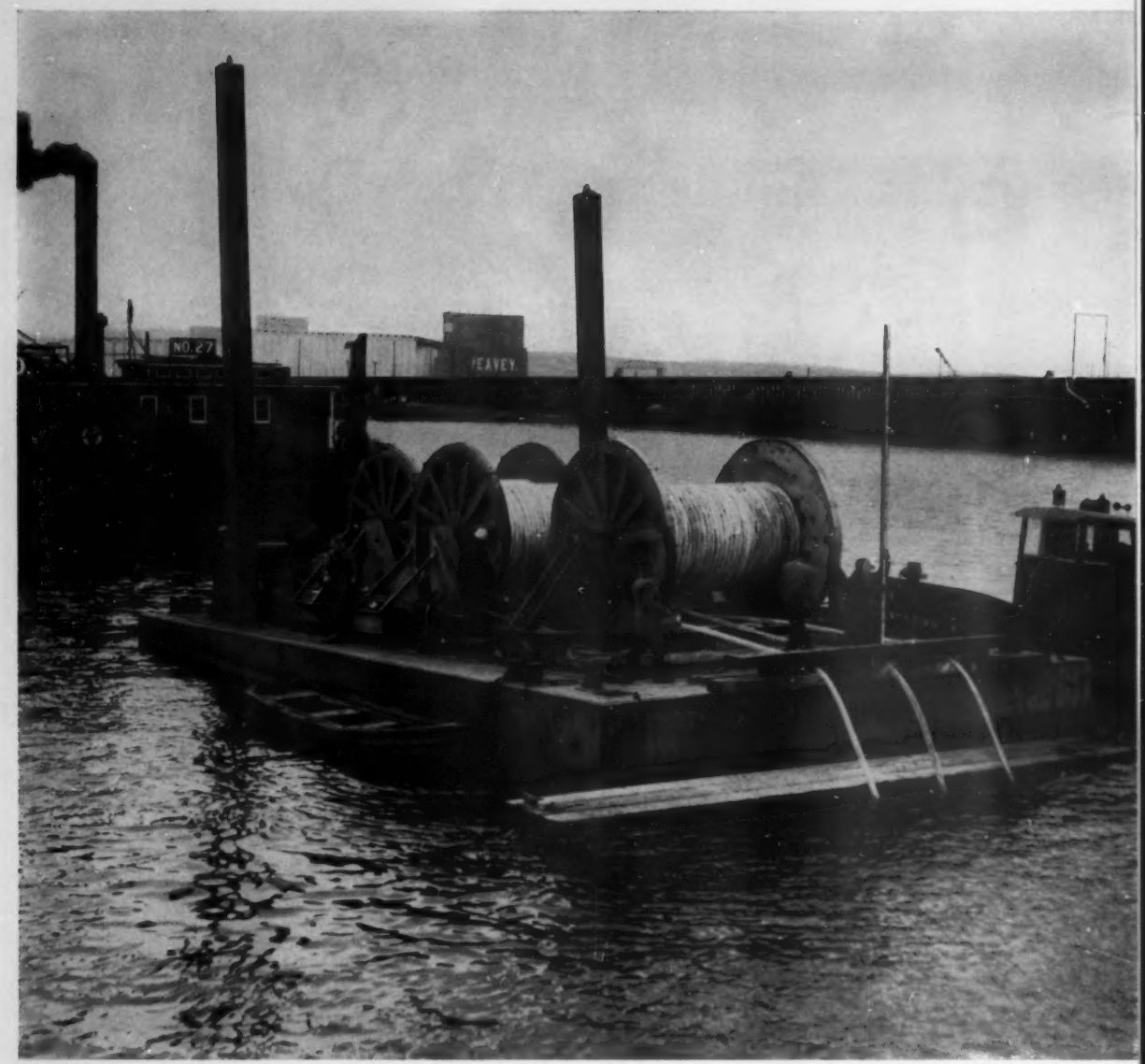

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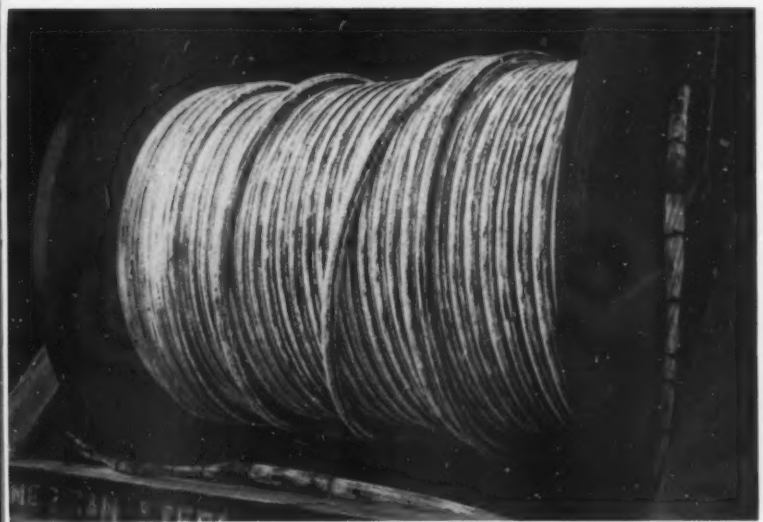

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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Most prosperous period

◆ LATEST GOVERNMENT figures (for the second quarter, 1959) now show the speed of the recovery pattern that has gripped this nation's economy during the past twelve month period.

Ever since the spring of 1958 when economic and business activity dipped to its low point, there has been a steady but important gain in the nation's economic health. However, it has been in the latest quarter just reported that the full impact of the economic improvement has been noted.

The figures given leave no room for doubt that today is the most prosperous period in history for the United States. To prove this point for yourself, just examine some of the statistics issued by the Department of Commerce and the Council of Economic Advisors to the President.

Personal income, seasonally adjusted, was reported at an annual rate of over $381 billion dollars for the second quarter of the current year. In 1958, for the similar period, personal income only reached an annual rate of $355 billion. This means that consumers have available for spending during this period some $26 billion more than during the preceding year.

The impact of this purchasing power on the market place has been felt by all manner of produced goods but has clearly shown up in the boom for consumer durables. If the same pattern of earnings and expenditures is maintained during the third quarter, there certainly should be some outstanding economic facts and figures to present early in October. As soon as Labor Day has passed there is usually a marked increase in consumer buying as the winter months draw nigh. School materials and children's clothing often put a huge bite on the family pocketbook this time of year.

It has been indicated that the rate of personal income is just one factor in economic health. Unless consumers are willing to part with their earnings for the goods they want or need, then the economy will quickly grind to a halt and income will show a marked and rapid decline. The same statistical sources indicate that consumer spending increased by more than seven per cent over the rate recorded in the second quarter of 1958.

During the second quarter of 1958, consumers spent their money at an annual rate of $291 billion. Consumer expenditures for the like quarter in 1959 topped $311 billion. It should be remembered that even in the low spots of the recent recession, consumer spending held up well. In fact, it was this fact more than any other that contributed to the quick recovery pattern. So this sharp increase in personal spending is all the more remarkable when viewed in retrospect.

Taxes and savings

Two factors that must always be considered in analyzing the weight of consumer spending upon economic activity are the rate of taxation and the rate of savings. Both factors of course exercise a somewhat restrictive effect upon the amount of money available for consumer buying.

Whereas tax payments are made involuntarily by consumers and cannot be controlled by the individual, the rate of savings is often construed to show that degree of confidence that people have in the continued strength of the economic picture.

The same relative interpretation can be given to another factor—that of repayment of loans in contrast to new loans made. Thus, all of these factors should be examined critically in order to judge the true character of consumer spending and earnings.

The rate of taxation by state, local, and federal governmental bodies increased to an annual rate of approximately $46 billion. This amounts to an increase of nine per cent over the rate for the like quarter a year ago. In spite of this increase, however, consumers still had a much higher amount of purchasing power to use in the market place for the goods and services they desire to acquire. It would appear that although the rate of taxation is increasing at approximately the same pace as personal income, it is not seriously affecting the amount of money available for use in consumer buying.

Savings rate 8% higher

In spite of the two previously mentioned influences (greater spending and heavier tax burdens) consumers have been able to increase the rate of their personal savings. The second quarter of 1959 showed savings accumulating at a rate eight per cent higher than a year ago. Personal savings were recorded during this period in the amount of approximately $24 billion.

In addition to this situation, there are two further indications of consumer saving. First, there was evidence of a continuing reduction of personal loans during the period with an excess of repayments over new loans made. In addition, the number of delinquent installments in all categories was reduced. This tends to indicate the growing strength of the consumers cash position with greater credit available, if needed, for durable purchases such as appliances, automobiles, and the like.

One might characterize the present consumer strength as a potentially explosive situation for the balance of the year. This, of course, is dependent upon the continuing strength of most segments of the economy. Considering that these factors (production, distribution, and so forth) remain strong and virile, then the balance of 1959 might provide unusual records for consumer spending.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

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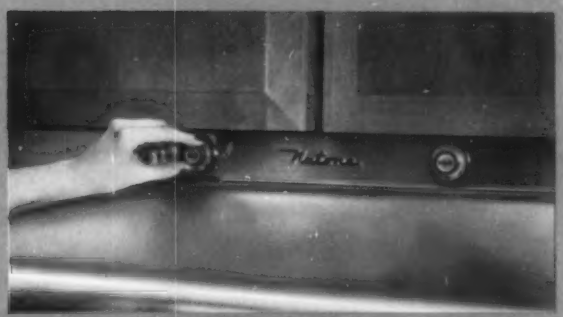

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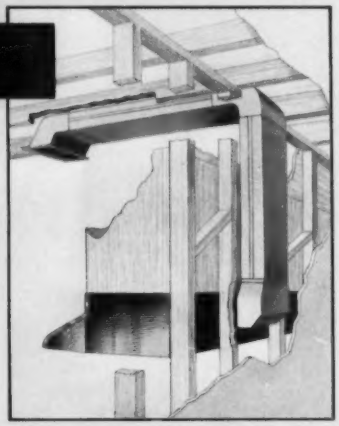
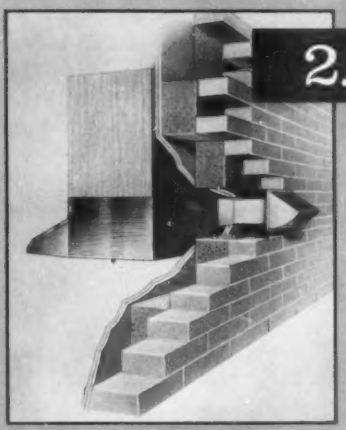
1. *Vertical*

Transition elbow in wall and ducts concealed between the wall studs.



2. *Horizontal*

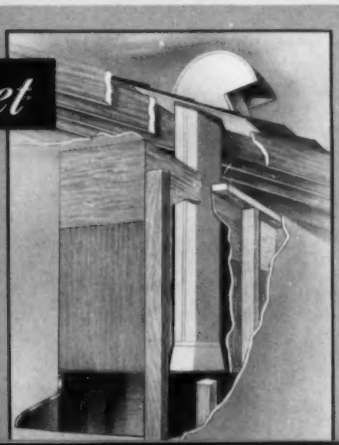


Ideal for outside wall. Horizontal discharge through outside wall cap.

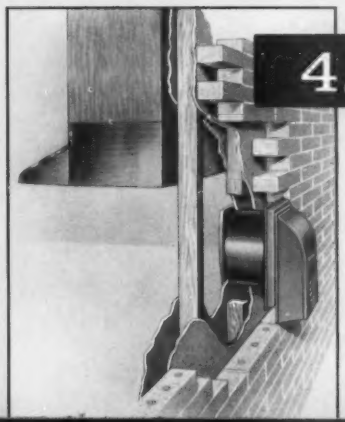
3. *In Cabinet*

For installation along the back wall of cabinet and soffit above.

← See other side



4. *In Wall*



For a wall fan installed below the hood on an outside wall.

Washington report

By Jack James
Digest of Washington news of special interest to the electrical industry

Steelworkers oust electrical contractor

A TRIAL EXAMINER for the National Labor Relations Board says that steelworkers were within their rights in forcing employees of Jackson Electric Company off a job at a Tennessee Coal & Iron mill at Winonah, Ala.

Jackson had contracted for the electrical work on an office moving project at the mill site. Pickets from Steelworkers Local 4203 forced Jackson employees — who were members of IBEW Local 136 —off the job, then blocked their return.

The mill is part of the Tennessee Coal & Iron Division of United States Steel Co.

Trial Examiner George A. Downing held that the dispute was primarily between U.S. Steel and the Steelworkers Union. Therefore it was legal.

The fact that Jackson had a contract from the prime contractor, Sullivan, Long, and Hagerty, was not even noted in Downing's decision. Apparently the contract had no bearing.

The next step is for the case to be ruled on by the National Labor Relations Board. If the Board members permit Downing's decision to stand, it will set a precedent that might allow any plant union to force contractors off renovation, maintenance, and construction jobs at any existing plant almost at will.

Here are the facts of the case as reported in the decision.

The contract between Local 4203 and TCI contained job descriptions for a number of trade jobs: electrician, carpenter, painter, millwright, and bulldozer operator. The contract gave laid-off employees priority for available work.

Toward the end of 1958 TCI contracted with Sullivan, Long, and Hagerty to move a small office building. Sullivan subcontracted portions of the work. Jackson was one of the subcontractors.

On January 29, 1959, a caravan of cars filled with Steelworkers arrived at the job site. They told the construction workers, including Jackson's employees, to leave. Work ceased, but was later resumed. A similar incident occurred four days later. In between these incidents Steelworkers' pickets turned back many construction workers as they drove along the road leading to the site.

Later, following a hearing in Federal Court, the Steelworkers allowed the construction crews to resume work. There was no further interference.

But the construction contractors excepting Jackson and unions brought charges against the Steelworkers claiming an illegal secondary boycott occurred. Trial Examiner Downing, who has handled some of the Board's more difficult cases in the past, disagreed.

Downing said that the primary object of the Steelworkers was to force TCI to assign work to its own employees. The interference with contractors, including Jackson, was incidental. Therefore, no secondary boycott.

"What is material," Downing wrote, "is that Respondent (the Steelworkers Local) had members in a lay-off status who had done similar work in the past. . .they could properly and lawfully advance demands that so much of the work be given their members as fell within the established job classifications."

Dallas and Washington up electricians' wages

DALLAS, TEXAS, and Washington, D. C., electrical contractors have raised wages for their union employees.

At Dallas contractors negotiated a two-year agreement with the IBEW raising wages 12½ cents this year, 12½ cents next year. With the first raise, the new hourly rate is $3.50.

At Washington, D.C., contractors also signed a two year contract with the IBEW. The pact provides a 20-cent increase each year. New hourly rates are, 0 to 20 miles, $4.20; 20 to 40 miles, $4.45; beyond 40 miles, $4.70.

Important debate on labor legislation

MEMBERS of the House of Representatives were considering, at this writing, making secondary boycotts against subcontractors (like electrical contractors) legal.

Unless amended, the compromise labor bill proposed by the House Labor Committee would do just that. Right now under the Taft-Hartley Act such secondary boycotts are illegal.

The Committee's bill had the full support of the powerful House Speaker, Sam Rayburn. At the deadline for this column, debate in the House on this and other labor bills was in full swing.

Here is an example of what might happen legally under the House Labor Committee's bill:

Suppose a non-union plumbing contractor worked on the same project as a union electrical contractor. The plumbers union could not win a contract from the contractor. The plumbers union could ask the IBEW, and indeed other craft unions, to pull their men off the job until the plumbing contractor gave in. The other unions would be allowed to follow this request. All work would stop. Within a few days the general contractor and other subcontractors with money tied up in the project would put so much pressure on the plumbing contractor that he would either have to sign a contract or allow a union contractor to finish the job.

At an extreme this bill would make it legal for unions to involve an electrical contractor in every labor dispute on every project on which he worked.

The exact language of the Bill

(Continued on page 88)

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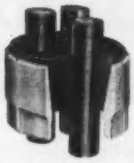
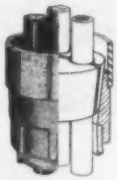
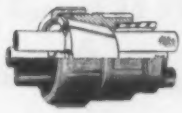
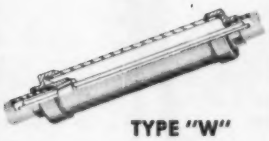


TYPE "C"



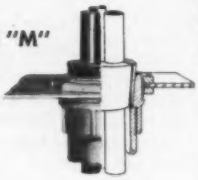


TYPE "K"



TYPE "W"

TYPE "M"



BUSHINGS

TYPE "B"

TYPE "SB"

EXPANSION FITTINGS

TYPE "EX"

TYPE "AX"

TYPE "EXE"

TYPE "DX"

Patented

CABLE TERMINATORS

TYPE "FR"

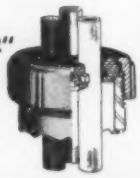
COMPOUND BUSHINGS

TYPE "DTC"

WITH TAPING CONES

TYPE "KR"

SEALING BUSHING



TYPE "CRH"

HORIZONTAL TERMINATOR

TYPE "CRC"

WITH TOP COVER

TYPE "CLN"

WITH TOP THREAD

PULL BOX FITTINGS

TYPE "PB"

NON-WEATHERTIGHT

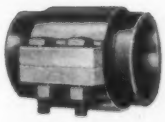
TYPE "PBW"

WEATHERTIGHT

END FITTINGS

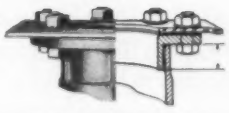
TYPE "E"

SPLIT COUPLINGS



TYPE "SP"

FLANGES



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Priced same as Bronze U-Bolts

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Only Sylvania VHO POWERTUBES*

give you all of these Very High Intensity lamp advantages!

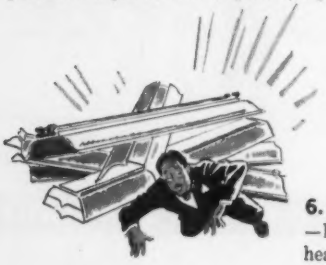
1. More than twice as much light as obtainable from standard fluorescent lamps of same size.

3. Easier to handle than competitive high intensity lamps . . . Sylvania VHO POWERTUBES weigh half as much as other shapes.

2. Smooth surface—the preferred tubular shape that does not catch and hold dust.

4. Smaller in size —T-12 1½" tube diameter permits better air circulation around the tube than larger diameter lamps.

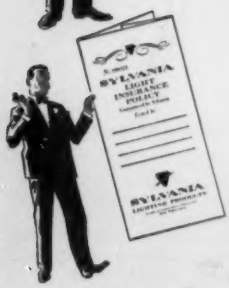
5. Lower in cost—less expensive to buy and install, provide more lumens. The 8-foot, 200-watt VHO POWERTUBE, for example, delivers 15,000 lumens! Easier to stay clean, quicker to wipe clean than special shape lamps.



7. Uniform light distribution delivers full light output in any position.

6. Does not require "oversized" fixtures —helps keep fixtures costs down, avoids heavy tube strain on fixtures.

8. Better optical control permits full use of light directed exactly where *you* want it.



And only Sylvania Fluorescent Lamps are backed by the exclusive Sylvania Light Insurance Policy!

Guaranteed by Sylvania, the Policy specifies if, in your opinion, Sylvania's lamps do not perform better than the brand you are now using, you may return them to our distributor and get your money back.

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SYLVANIA LIGHTING PRODUCTS
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Salem, Massachusetts
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9

SYLVANIA GENERAL SYSTEM
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

...triples gross with Berko electric radiant heating!

Chicago Heights contractor used to gross $700 per home... now averages more than $2,000!

"We almost had to give it away!" says Harold Hensley, owner of Hensley Electric Co. when he talks about his early start in electric heating. Today, six years later and with a backlog of business that's the talk of the area, the situation is quite reversed. Hensley reports that in two similar projects with homes in the $20,000 range, the project without electric heating had electrical work valued at $700 per home. In the one with electric heating, Hensley's gross comes to more than $2,000 per home! The interesting fact is that electric heating alone does not account for all of this larger gross. Hensley has found that builders are willing, even anxious, to upgrade the quality and extent of the entire electrical installation when electric heating is installed.

BERKO WAS THE DIFFERENCE

"Growing up in the electric heating business was rough," Mr. Hensley says. "We had trouble with some types and makes of electric heaters and researched and tested all of them. We finally settled on Berko glass radiant panels. Customers liked the appearance and radiant heating; we liked the fast installation and reliability. We've never had a make-good!

"Once we decided on the product, we began to advertise it in our local papers and talked electric heating whenever and wherever we could. Then when we got a few jobs in—mostly supplementary heating—electric heating really began to take off. Instead of a heater for the bathroom or a couple of panels for the porch, we were converting older homes to electric heating, and putting it in new homes."

"BERKO PANELS ARE MOST VERSATILE OF ALL"

"Nothing can burn up a crew's time and my profit margin like installation troubles. Berko's heaters, particularly their baseboard units, are designed with the contractor in mind. Their flexibility in installation after the house is roughed in has been responsible for increasing my profits on many housing jobs."

BERKO OPENS THE DOORS TO BIG BUILDERS...

"I am now working on fifteen new housing developments," Mr. Hensley declares. "Not all of them specify electric heating, but electric heating has been responsible for getting me started with the builders. Previously these builders were satisfied with their electrical contractors and many wouldn't even talk to me. Then as their interest—and my reputation—in electric heating grew, and as they saw their competitors sell-out projects where I had installed Berko electric heating, they invited me to bid. My experience with Berko was the only edge I had over their regular contractors, but I got the jobs."

...AND TO BIG BUSINESS!

"We are so busy working on project homes we can't spare crews for individual homes right now. We have had to suspend our advertising. But we still get inquiries every day. I don't know who will be putting in these installations until we can get around to them, but I do know there's an awful lot of Berko business waiting for any contractor who doesn't mind reaching to pick up the order!"

Harold Hensley, owner of Hensley Electric Co., Chicago Heights

Hensley going over plans for a Berko installation with one of his foremen. From the "blues," he makes his own electrical installation plans for each crew to follow.

Hensley gives much of the credit for increased profits to the speed and simplicity with which Berko panels are installed.

Berko baseboard glass radiant panels with duplex receptacles installed beneath picture window in project home. (Inset) Henry Berg & Son model home, Chicago Heights . . . transformed by electric heating from an ordinary wiring job to an impressive quality electrical installation. Hensley Electric is installing Berko glass radiant heating in 80 homes of this project.

For information about the complete Berko line write Dept. ES9

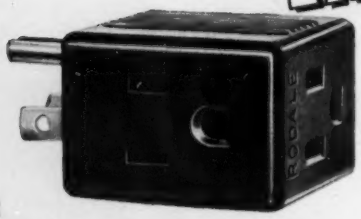
BERKO

BERKO ELECTRIC MANUFACTURING CORP.
212-40 JAMAICA AVENUE, QUEENS VILLAGE 28, N. Y.

ONE'LL GET YOU THREE...

WITH NEW Rodale CUBE TAPS

EXCLUSIVE

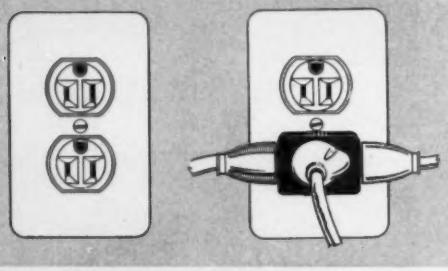


482

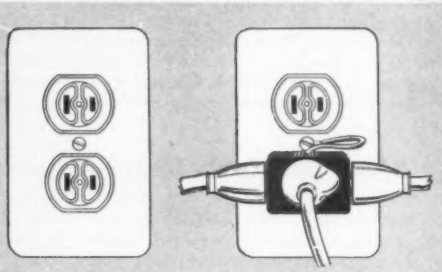
TRIPLE OUTLET GROUNDED CUBE TAP

483

TRIPLE OUTLET GROUNDING ADAPTER



—Converts ONE grounding outlet into THREE grounding outlets. Engineered to meet ever-increasing use of 3 wire grounded caps. Use one of these streamlined taps in a duplex receptacle . . . have the other outlet available, if needed.



—Converts any standard 2-wire outlet into THREE 3-wire grounding outlets. Trim enough to accomodate one tap in a duplex receptacle leaving the other outlet available for use. Merely attach grounding lead to plate screw and the outlet is converted.

Rated 15A-125V with colors in modern brown and ivory.

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Patent Applied For.

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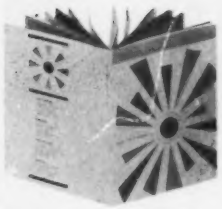
Rodale / manufacturing co., inc. dept. S9, emmaus, pa.



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CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

LIGHTING PANELBOARDS — A 4-page descriptive folder featuring a line of plug fuse and toggle switch panelboards for lighting control circuits is now available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis, Mo. The folder includes box sizes, details of construction, wiring gutters, special features, and catalog numbers.

Write in No. D100 on card, Pg. 18

CIRCUIT PROTECTION — A 24-page illustrated handbook contains suggestions for selecting the right kind of protection for electric circuits, motors, appliances and apparatus. Includes motor wiring diagrams and a complete list showing proper size fuses to use. Available from Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

Write in No. D102 on card, Pg. 18

ELECTRIC HEATERS — A new catalog describing their line of electric heaters is available from Hunter Division of Robbins & Myers, Inc., Memphis 14, Tenn. The bulletin, Form No. EH-122, contains the design features and specifications of R&M-Hunter automatic baseboard, convection baseboard, wall, portable, and bathroom heaters.

Write in No. D103 on card, Pg. 18

MODULAR LIGHTING—A twelve-page folder describing and illustrating their line of surfaced and recessed fluorescent modular fixtures is announced by Moe Light of Thomas Industries Inc., Lighting Division, 410 S. Third St., Louisville, Ky. Complete coefficient of utilization and candlepower distribution tables are included for each set of fixtures.

Write in No. D104 on card, Pg. 18

MANHOLE HEATER—A four-page brochure issued by Morrison-Pelsue Co., 2256 S. Delaware S., Denver 23, Col., describes and illustrates applications of the MoPeCo Ventilating Heater available in several models, electrical or gasoline engine powered.

Write in No. D105 on card, Pg. 18

LIGHTING FIXTURES—A four-section, 72-page catalog printed in full color is now available from EJS Lighting Corp., 921 E. Pico Blvd., Los Angeles 21, Calif. The four sections include hundreds of designs classified as residential, architectural, special, bullets and portables.

Write in No. D106 on card, Pg. 18

HYDRAULIC POWER TOOLS—A new bulletin describing their two-speed, fast-approach portable power unit for hydraulic tools such as conduit benders, cable pullers, and pipe pushers is announced by Greenlee Tool Co., Rockford, Ill.

Write in No. D108 on card, Pg. 18

CONDUIT WIREHOLDERS — A new information sheet describing their line of all-purpose conduit wireholders is now available from Knox Procelain Corp., P. O. Box 2031, Knoxville, Tenn. The illustrated sheet gives installation information, design features, and specifications.

Write in No. D109 on card, Pg. 18

LAMP GUIDES—Sylvania Lighting Products, 60 Boston St., Salem, Mass., has made available three lamp guides containing general information, technical data, and catalog listings on their lines of fluorescent lamps, incandescent lamps, and mercury lamps.

Write in No. D110 on card, Pg. 18

PLUGS, RECEPTACLES — Two basic designs — explosion-proof and weatherproof—of Killark plugs and receptacles are fully covered in a new catalog section. This line offers many advantageous features, and is available in many styles and sizes to fit various boxes. Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis 13, Mo.

Write in No. D111 on card, Pg. 18

ELECTRICAL DEVICES — Two publications, the pocket Federalog 111-PR and Bulletin 3-230, have been made available by Federal Pacific Electric Co., 50 Paris St., Newark, N. J. Complete details concerning circuit breakers, panelboards, fusible service equipment, safety switches, industrial motor control and lighting and power panelboards are contained in the 32-page pocket-sized catalog. The 8-page bulletin is devoted to the company's new line of QMQB fusible switches and panelboards.

Write in No. D112 on card, Pg. 18

BUILT-IN HEATERS—Thermador Electrical Manufacturing Co., 5119 District Blvd., Los Angeles 22, Calif., has announced the availability of three new catalog sheets on their line of built-in electric heaters. The heaters described are their portable radiant-fan heater, electric ceiling heater, and baseboard electric heater.

Write in No. D113 on card, Pg. 18

PRICE SERVICE—Specimen copies of the National Price Service price books are available on request from Henderson-Hazel Corp., 13601 Euclid Ave., Cleveland 12, Ohio. Please indicate whether you are a contractor or wholesaler. Each specimen includes a complete index, a representative sampling of completely illustrated price sheets, and information of special interest to those concerned with pricing electrical construction materials.

Write in No. D114 on card, Pg. 18

FLUORESCENT FIXTURES—The new Miller Sabre fluorescent fixture is illustrated in the Sabre catalog, page 13, published by The Miller Company, Meriden, Conn. This page points out application, construction details, and dimensional, illumination, and installation data.

Write in No. D115 on card, Pg. 18

CABLE SUPPORTING TRAYS—The Globe Co., 4000 South Princeton Ave., Chicago 9, Ill., has made available a new catalog on their line of cable supporting tray systems and accessories. The catalog contains information on design features, specifications, and installation.

Write in No. D116 on card, Pg. 18

CENTRIFUGAL ROOF VENTILATORS—An 8-page, two-color folder (SDA-220) gives construction features, performance data, dimensions and recommended specifications for the new Centrifugal Roof Ventilator manufactured by The Peerless Electric Company, Warren, Ohio. Other important Peerless Fan and Blower products and a list of Peerless sales representatives are also included.

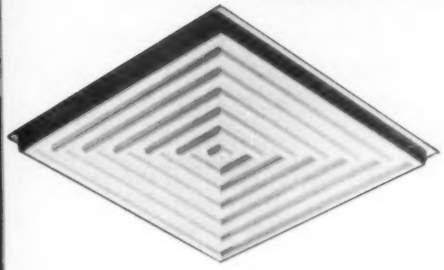
Write in No. D117 on card, Pg. 18

CONDUIT FITTINGS—Bridgeport Fittings, Inc., 209 Center St., Bridgeport, Conn., offers a twenty-six page catalog describing their line of conduit, bushings, lock nuts, couplings, nipples, supports, connectors, and other fittings. Size, weight, and packing details are included.

Write in No. D119 on card, Pg. 18

LUMINOUS CEILINGS?

we suggest . . .



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APPLICATION:

For smart, appealing, shadow-free illumination that covers almost all overhead unsightliness. Modern and decorative for both new installations and remodeling.

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Available in a wide variety of vinyl and styrene plastics in various sizes and patterns, plus louvers (steel or plastic), Honeylite (aluminum) or corrugated continuous plastic. (Write for catalog)

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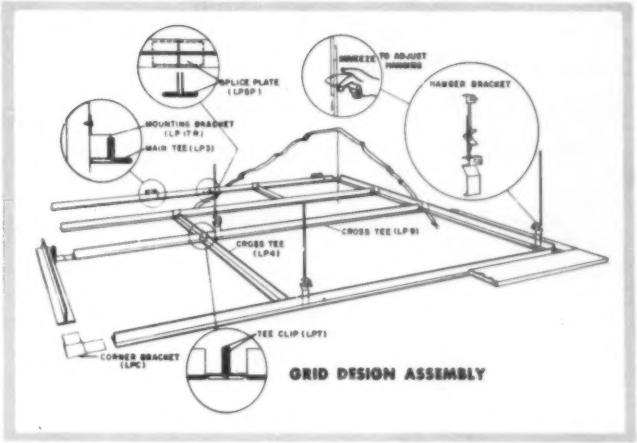

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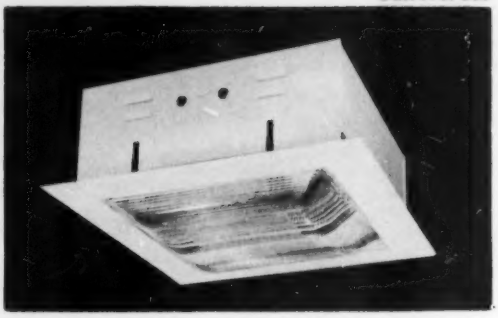
LIGHTING A CORRIDOR?

Cat. No. 860

. . . we suggest the



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For your next corridor installation check these features of the Delta Corridor Lite—specifically designed for corridor lighting:

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Chattanooga, Tenn.

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Irving Milow
415 Clover St.
Rochester, New York

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Atlanta, Georgia

J. Louis Weyhing
1914 Rutherford Ave.
Louisville, Kentucky

Irvin Spero
4142 Stillmore Rd.
South Euclid, Ohio

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2976 Randy Lane
Dallas, Texas

Arthur H. Swartz
5003 Kelso St.
Houston, Texas

J. F. Hisserich
2001 Big Bend Ave.
St. Louis, Missouri

Joe E. Pearce & Associates
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Indianapolis, Indiana

Associated Manufacturers Agents
900 Carondelet St.
New Orleans, Louisiana

Bill Sylvester
2144 Welton St.
Denver, Colorado

Newell L. Willard
3625 Ivy
Denver, Colorado

J. A. Goode Company
15842 James Couzens Ave.
Detroit 38, Michigan

Gerald Preacher
1225 Pickens
Columbia, South Carolina

Light & Power Utilities Corp.
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Memphis, Tennessee

INFORMATION CENTER

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Help yourself to free literature and more details on any product mentioned in this issue.

Instead of writing a dozen different manufacturers for free literature and more information on products, tools, or services, just insert on the cards below the appropriate key numbers of the items in which you are interested. These cards may be used to get information on products mentioned in the following departments (see Contents Page for page number):

Catalogs and Bulletins — New Electrical Products
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SEPTEMBER, 1959

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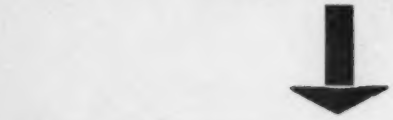
City _____ Zone____ State_____

These cards can help you get valuable information



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ATLANTA 8, GEORGIA

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

SPACE HEATING GUIDE—Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on a study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts and floor plan examples.

Write in No. D120 on card, Pg. 18

NON-METALLIC FIXTURES — A new complete condensed catalog with list prices covering their complete line of non-metallic lighting fixtures is now available from Union Insulating Co., P. O. Box 351, Parkersburg, W. Va.

Write in No. D122 on card, Pg. 18

CONNECTOR BULLETINS — Six new bulletins have been released by Ilsco Corp., 4730 Madison Rd., Cincinnati, Ohio. They cover the Ilsco line of solderless connectors, special connectors, lugs, neutral bars, crimp lugs, and the Ilsco Lok-A-Blok. The bulletins include descriptive material, dimensions, and packaging data.

Write in No. D123 on card, Pg. 18

TROFFER CATALOG—A 36-page catalog, with complete information on their newly re-designed architectural troffers has been released by Smithcraft Lighting Division, Chelsea, Mass. Divided into sections for selection of lighting units, the catalog gives complete illustrations and data for 1 and 2 foot troffers in all types of ceiling construction. Also included in the catalog is information on ceiling lighting patterns, shielding designs, lighting techniques and applications.

Write in No. D126 on card, Pg. 18

LIGHTING FIXTURES—Progress Manufacturing Co., Castor Avenue and Tulip Street, Philadelphia 34, Pa., announces the publication of two new lighting catalogs. "Lighting by Progress", a 52-page booklet, describes their line of residential fixtures. "Home Lighting by Minute Mount" is a 12-page bulletin illustrating new ideas in budget lighting.

Write in No. D131 on card, Pg. 18

MOTOR CONTRACTORS — For control of large motors, primay switching of induction furnace transformers, and other high voltage applications, **Allis Chalmers Manufacturing Co.**, Milwaukee 1, Wis., has developed the **high voltage air-break contractors** (type 256A) which are described in a bulletin issued by the company.

Write in No. D132 on card, Pg. 18

ELECTRICAL DUCTS — A brochure is now available from John-Manville, 22 East 40th St., New York 16, N. Y., describing their line of Transite electrical ducts. The two-color, 11-page, illustrated bulletin contains information on composition, methods of manufacture, applications, costs, and installation. Also included are shipping weights and dimensions of Transite conduit and Korduct.

Write in No. D133 on card, Pg. 18

TRANSFORMER MOUNTS—Universal Pole Bracket Corp., P. O. Box 8454, Houston 4, Texas has announced the publication of a catalog describing their line of transformer mounts and capacitor racks. The illustrated bulletin contains catalog information and data on design features, installation, handling, and warehousing.

Write in No. D134 on card, Pg. 18

TRANSFORMERS—R T & E Corp., 1900 E. North St., Waukesha, Wis., has available a bulletin describing Terra-Tran transformers for residential underground distribution. The 15-page booklet is illustrated and contains complete information on construction, application, and design features.

Write in No. D135 on card, Pg. 18

PIPE TOOLS—A new catalog containing dealers' net prices is now available from Nye Tool Co., 4120 Fullerton Ave., Chicago 39, Ill. The bulletin is illustrated and contains information on design features and applications of Nye pipe tools.

Write in No. D137 on card, Pg. 18

RADIANT HEATING — Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn., has announced the availability of a bulletin describing their line of concealed radiant home heating systems. The bulletin includes the principles of radiant heating, installation procedures, and advantages of this heating system.

Write in No. D138 on card, Pg. 18

LIGHTING FIXTURES — A 28-page, illustrated booklet from Lavery and Co., Inc., 15479 Starthern St., Van Nuys Calif., describes their line of lighting fixtures for western, ranch, early American, homestead, and ranch modern homes. Specifications and catalog data are included.

Write in No. D139 on card, Pg. 18

EXPLOSION-PROOF EQUIPMENT—"An Electrical Engineer Comes to Crouse-Hinds" is the title of a new 6-page folder by Crouse-Hinds Co., Syracuse 1, N. Y. The bulletin describes design and construction principles involved in manufacturing Crouse-Hinds Condulet electrical equipment for hazardous locations.

Write in No. D140 on card, Pg. 18

RESIDENTIAL LIGHTING — A new catalog featuring their line of residential lighting fixtures has recently been issued by John C. Virden Co., 6103 Longfellow Ave., Cleveland 3, Ohio. The 48-page booklet is illustrated and in color. It pictures and describes incandescent and fluorescent fixtures for every room in the house and every design motif.

Write in No. D141 on card, Pg. 18

HYDRAULIC EQUIPTENT—Truck Equipment Co., 3963 Walnut St., Denver 5, Colo., has made available a catalog containing information on their lines of hydraulic derricks, cable reel carriers, and diggers. It is illustrated and contains data on design features, specifications, and application.

Write in No. D142 on Card, Pg. 18

WATER HEATING BOILER — Precision Parts Corp., 400 N. First St., Nashville 7, Tenn., has available a bulletin containing catalog information on their electric hot water heating boiler, diagrams of the boiler, and data on the advantages of its use. The boiler comes complete with water circulator and safety valve on models A through K.

Write in No. D143 on Card, Pg. 18

FLOOD LIGHTING STANDARDS—An 11-page booklet describing their line of flood lighting standards is available from Kerrigan Iron Works, Inc., P. O. Box 479, Nashville 2, Tenn. Contained in the booklet are catalog data, diagrams of the equipment, specifications, and suggested methods of wiring supply to floodlights, as well as other installation procedures.

Write in No. D144 on Card, Pg. 18

Revere Outdoor Lighting makes driving and parking safe and easy at Eastpoint Shopping Center, Baltimore, Md. The well lighted parking lot makes the shopping center look more inviting. Architect: Kenneth C. Miller; Consulting Mechanical Electrical Engineers: Whitman, Requardt & Associates; Electrical Contractor: Harry A. Goldberg Co.; Electric Wholesaler: Graybar Electric Co., Inc.

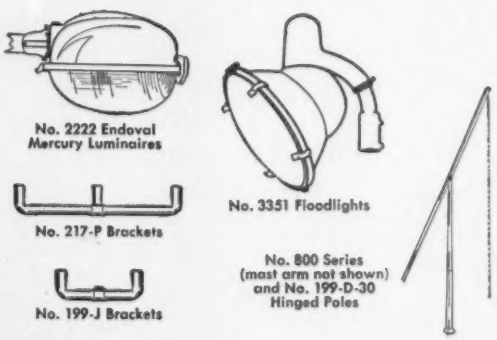
Revere's complete line of matched equipment makes any outdoor lighting job easier

Any outdoor lighting problem is easier to solve with Revere equipment. The wide line, from one source, lets you select the exact combination of fixtures required to do the job best . . . simplifies ordering and assures on-schedule delivery, too.

At Eastpoint Shopping Center (above), Revere Endoval Mercury Luminaires, mounted on Revere hinged poles, illuminate driving lanes. Parking area lighting is provided by Revere floodlights with 400-watt EH-1 mercury lamps. Floodlights are mounted two or three to a Revere hinged pole, with pole spacing 150 ft. Ballasts are in manholes between poles. Average maintained footcandles 1.1.

Installation of equipment at Eastpoint was easier because Revere components are *matched* for strength, balance, and perfect fit . . . and for peak lighting efficiency. Write for a Revere outdoor lighting equipment catalog. The complete, matched line makes solving any outdoor lighting problem easier.

Revere components used to light shopping center


No. 2222 Endoval Mercury Luminaires
No. 3351 Floodlights
No. 217-P Brackets
No. 800 Series (mast arm not shown) and No. 199-D-30 Hinged Poles
No. 199-J Brackets

Revere ELECTRIC MFG. CO.

OUTDOOR LIGHTING

Revere Electric Mfg. Co. • 7420 Lehigh Avenue • Chicago 48, Illinois (In suburban Niles)
Long Distance Phone: NIles 7-6060 • Chicago Phone: SPring 4-1200 • Telegrams: WUX Niles
In Canada: Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Tremendous National Fall Promotion On

MOE Light®

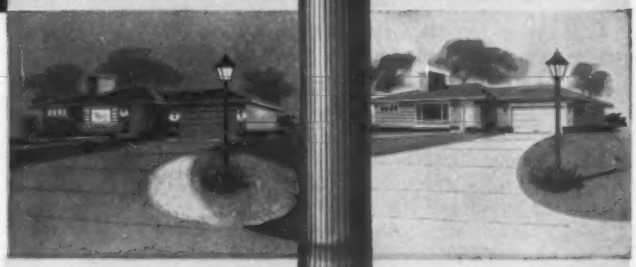
"ELECTRIC EYE"

POST and LANTERNS

M-844/M-923 (Left)
"Light Command" Post & Lantern Combination. Lantern 9½" square, 19¼" high. Black on Solid Aluminum with Solid Brass Trim.
Regular Dealer Price.... $27.94
Special Dealer Price $23.97

MOE LIGHT
"Light Command"
turns **ON** at sundown...

OFF at sunrise!



SPECIAL PROMOTION PRICES

Here's a terrific new attraction for all your customers — priced to move fast. Sensational "Light Command" post has photoelectric control unit that turns lantern on/off automatically. Not affected by other light sources. Ideal for home driveways, patios; hotel, motel, camp, resort, estate grounds.

NATIONALLY ADVERTISED

Big color ads in the "big influence" magazines, October and November issues, will reach 11,300,000 readers.

HOUSE BEAUTIFUL HOUSE & GARDEN
LIVING FOR YOUNG HOMEMAKERS

FREE COLOR POSTERS

Big wall or window posters, featuring post-lantern combination with SPECIAL INTRODUCTORY PRICE, will help you sell.

M-853/M-923 (Left)
"Light Command" Post & Lantern Combination. Lantern 11½" high, 20" shade. Black on Solid Aluminum with Solid Brass Trim.
Regular Dealer Price..... $29.94
Special Dealer Price... $26.97

M-923 (Right)
"Light Command" Post ONLY. Adjustable from 72" to 84". Pre-wired, grounded, UL approved convenience outlet meets all local codes. Black on Solid Aluminum. Patent Applied For.
Regular Dealer Price..... $16.77
Special Dealer Price..... $15.57

Announcing a Sensational New MOE Light OUTDOOR LINE.
HIGH STYLE, HIGH QUALITY, HIGH PROFIT!
Colorful new catalog folder now available.

SPECIAL INTRODUCTORY PRICES UNTIL NOVEMBER 30, 1959 ONLY.

SEND TODAY FOR FULL DETAILS

THOMAS INDUSTRIES INC.
LIGHTING FIXTURE DIVISION
410 S. Third St., Louisville 2, Ky.

MOE LIGHT · STAR LIGHT · BENJAMIN
ENCHANTE · SAN MARINO

THOMAS INDUSTRIES INC., Lighting Fixture Division
410 S. Third Street, Louisville 2, Ky., Dept. ES-9

☐ Rush full details on your special Post & Lantern promotion.
☐ Send catalog folder on new high style Outdoor Fixture line.

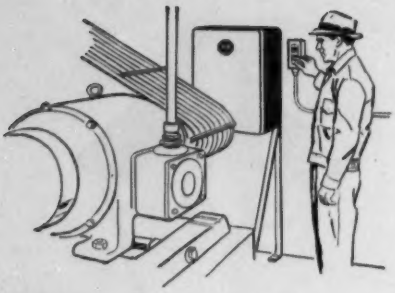
Company.....

Address.....

City..... Zone..... State.....

Your Name.....

Visit our Booths 51-52 at the NECA Convention, Fontainebleau Hotel, Miami Beach, November 9-12

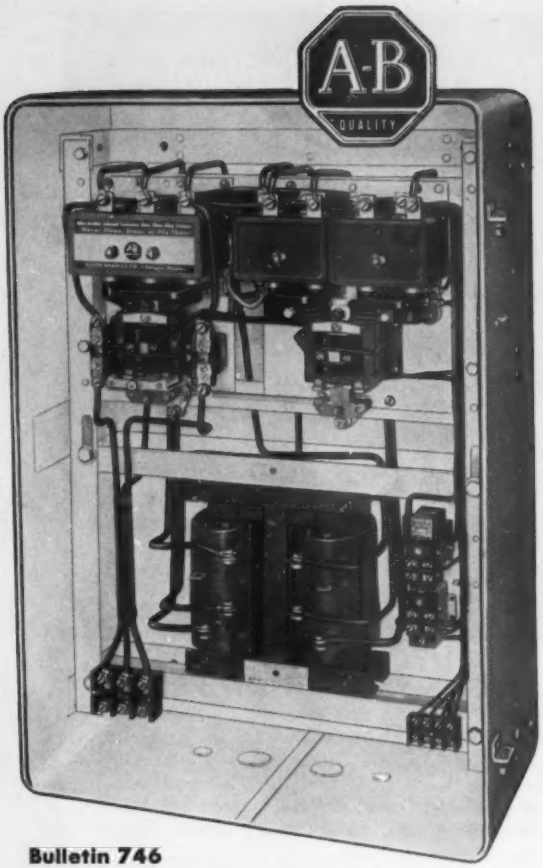


WHEN REDUCED VOLTAGE STARTING IS A MUST

Only Allen-Bradley can provide all the answers

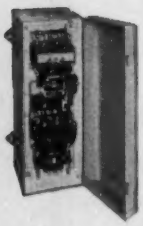
The Allen-Bradley line of reduced voltage starters makes possible a selection of the best starter, not only to meet the power company's requirements but also to provide the best starting conditions for the motor and the "load" that it drives.

The simple solenoid contactors in A-B reduced voltage starters have only ONE moving part—assuring millions of trouble free operations. And their double break, silver alloy contacts never need costly maintenance. Accurate, reliable overload relays protect motors against burnouts. Write for Publication 6088.



Bulletin 746

Automatic reduced voltage starter for squirrel cage motors that should not be started on full line voltage. It employs autotransformer connected in open delta to reduce line voltage during starting. Adjustable timing relay controls starting period. Taps are provided on the autotransformer to adjust the starting voltage applied to the motor. Maximum ratings to 300 hp, 220 v; 600 hp, 440-550 v.

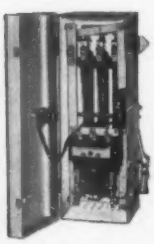


Bulletin 740

Graphite disc resistors are automatically inserted in series with the squirrel cage motor at starting, and they are automatically cut out after a predetermined time. Turning a single screw on the starter frame adjusts the compression resistors exactly to motor and load conditions for velvet smooth acceleration. Ratings to 200 hp, 220-440-550 v.

Bulletin 640

Where remote control is not needed, these graphite compression disc resistor starters provide stepless acceleration of squirrel cage motors. Operated by hand lever, the smooth starting of the motor is under the control of the operator. No-voltage and dependable overload protection is provided. Ratings to 200 hp, 220-440-550 v.



ALLEN-BRADLEY | QUALITY MOTOR CONTROL

Allen-Bradley Co., 1305 S. First St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

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BALTIMORE—H. M. Wood & Co., Inc., 124 Light St., Tel: MUlberry 5-4643
BIRMINGHAM—J. L. Howarth Co., Inc., 825 S. 22nd St., Tel: FAirfax 3-1171
CHARLESTON—Henry E. Payne, 918 Kanawha Blvd., E., Tel: Dickens 3-1393
CHARLOTTE—LeRoy P. Spoon, 307 Lincoln St., Tel: EDison 4-6334
DALLAS—J. K. Webb, 2810 McKinney Ave., Tel: TAylor 3-6179
HOUSTON—Allen-Bradley Co., 2105 McKinney Ave., Tel: CApitol 5-0747
JACKSONVILLE—Robert P. Smith & Co., 1446 June St., Tel: EXbrook 8-0531
KANSAS CITY—B. L. McCreary & Son, 1819 Central St., Tel: HArrison 1-1668
KNOXVILLE—Bowditch & Co., 1311-C N. Broadway, P. O. Box 3145, Tel: 4-2513
LITTLE ROCK—Curtis H. Stout, Inc., 400 Shall St., P.O. Box 107, Tel: FRanklin 4-8201
LOUISVILLE—Rietze & Co., 2209 S. Floyd St., Tel: MElrose 7-3603
MEMPHIS—Curtis H. Stout of Tennessee, Inc., 718 M&M Bldg., Tel: JAckson 6-7601
MIAMI—Charles R. Lee & Assoc., Inc., 3524 W. Flagler St., Tel: Highland 4-7414
NEW ORLEANS—Robbins & Robbins, 1037 Magazine St., Tel: JAckson 2-5805
RICHMOND—H. M. Wood & Co., Inc., 2016 Second Ave., Tel: Milton 3-8529
ST. LOUIS—Allen-Bradley Co., 904 N. Grand Blvd., Tel: JEfferson 5-1901
TAMPA—Robert P. Smith & Co., 1521 South Dale Mabry Highway, Tel: 8-3632
TULSA—John W. Elder Co., 1526 East Fourth St., Tel: Diamond 3-9149

No trouble calls with PUSHMATIC

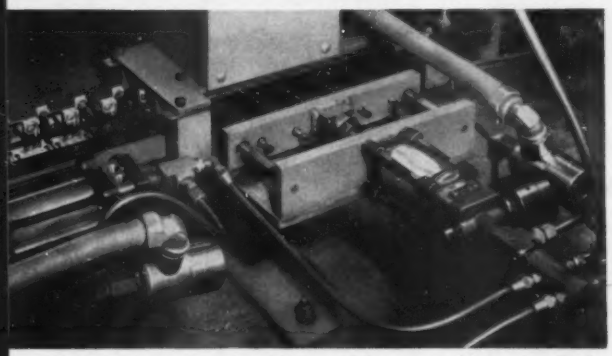
Every breaker is individually performance tested

Browse along our production line and it will be apparent why this circuit breaker has earned the reputation as the *safest and most dependable* on the market. Following are five of the dozen or more exhaustive checks and quality controls the Pushmatics undergo — over and beyond those required by Underwriters'.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

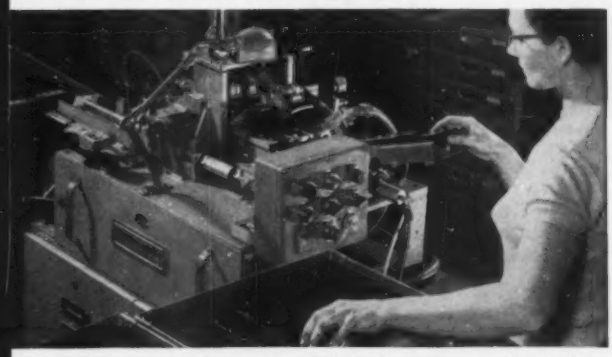
In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

1. CALIBRATION In a dust-free room, where temperature is maintained at a constant 75°, operators calibrate *every* Pushmatic bi-metal assembly on a special optical viewer. Each bi-metal "latch" is adjusted to a dimensional accuracy of 1/1000 of an inch. Prior to this, the bi-metal had been heat-treated in an inert atmosphere to relieve stresses, "normalize" the metal.

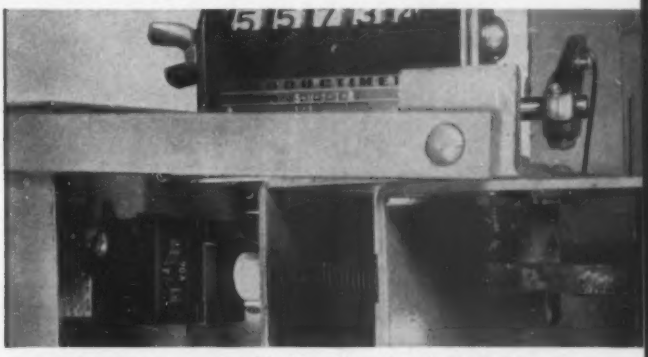


2. MECHANICAL BREAK-IN After assembly every Pushmatic is operated 50 times to make absolutely sure it functions well mechanically. Ten break-ins would be adequate . . . the extra 40 give you that much more assurance that it will never fail in manual or automatic operation.

3. CALIBRATION UNDER LOAD Brought back to its "set" temperature, each breaker is checked at 200% of rated current, and again at the equivalent of 125% of rating. Check Boards are accurate to 1/10 of a second. Samples from each production run are also tested at 100% of rating.



4. SHORT CIRCUIT TEST Being thermal-magnetic devices, Pushmatics then undergo severe short circuit currents to test the instantaneous trip time of the magnetic element. If a breaker fails to trip within .02 seconds, it is automatically rejected by the machine. Extra safety, extra performance.



5. ENDURANCE TEST Underwriters' Laboratories run periodic endurance tests on BullDog Pushmatics®. The requirement — 10,000 operations, 6000 under load and 4000 with no load. But BullDog constantly checks out the breakers at 50,000 or more operations. *End trouble calls. Use Pushmatic!*

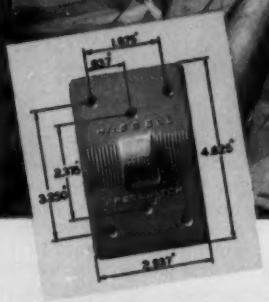
Consult the following Southern representatives:

Wilson Electrical Equipment Co.
3210 Garrow St., P.O. Box 1725
Houston, Texas

Wilson Electrical Equipment Co.
101 E. Maple Street
San Antonio, Texas

Standard Electric Mfg. Company
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

Walker Electrical Co., Inc.
125 Bennett St., N.W., P.O. Box 2308, Station D
Atlanta, Georgia

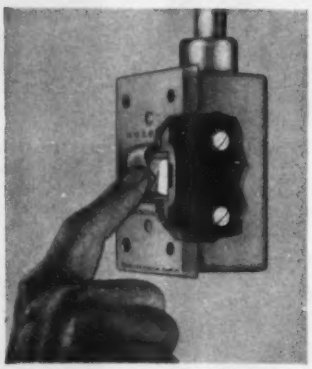


CAT. NO.
1751

WEATHERPROOF

*INSULPRENE PLATE and A.C. presSwitch COMBINATION

Introducing a combination unit—complete in one box—including weatherproof "Insulprene" plate and A.C. "Presswitch"... designed for all general outdoor applications: shipping areas, parking lots, gas stations, breezeways, etc. The weatherproof "Insulprene" plate fits both FS and standard wall boxes. The combination is available with 15 or 20 amp. "Presswitch" either single pole, double pole, 3-way or 4-way. "Insulprene" plate resists oil, hot water, live steam, extreme cold, grease, etc.



Cut-away shows A.C. "Presswitch" mounted in FS box and protected by new Weatherproof "Insulprene" Plate.

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

*made of DuPont Neoprene

For complete information write

HARVEY HUBBELL, INCORPORATED
Bridgeport 2, Connecticut

WIRING DEVICE OFFICE AND WAREHOUSE LOCATIONS

Bridgeport 2, Connecticut
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Chicago 7, Illinois
37 South Sangamon Street

Los Angeles 12, California
103 North Santa Fe Avenue

San Francisco, California
1675 Hudson Avenue

IN CANADA:
Scarborough, Ontario,
1160 Birchmount Road

Wanted: Manuscripts for publication

The editors of Electrical South will welcome contributions from the field for publication. Electrical contractors, consulting electrical engineers, light and power company engineers, and others closely associated with the electrical industry are invited to submit articles, photographs, and drawings relating to important and interesting electrical projects in the South and Southwest.

Articles are wanted in two principal classifications:

Wiring and Lighting: **Articles on interesting and unusual electrical installations; any phase of electrical contracting such as business promotion, estimating, handling men and materials, etc.**

Utility Engineering: **Articles relating to any phase of transmission, distribution, and metering, including design, installation, testing, and maintenance. These articles should be "by-line" articles carrying the name of a Southern or Southwestern light and power company.**

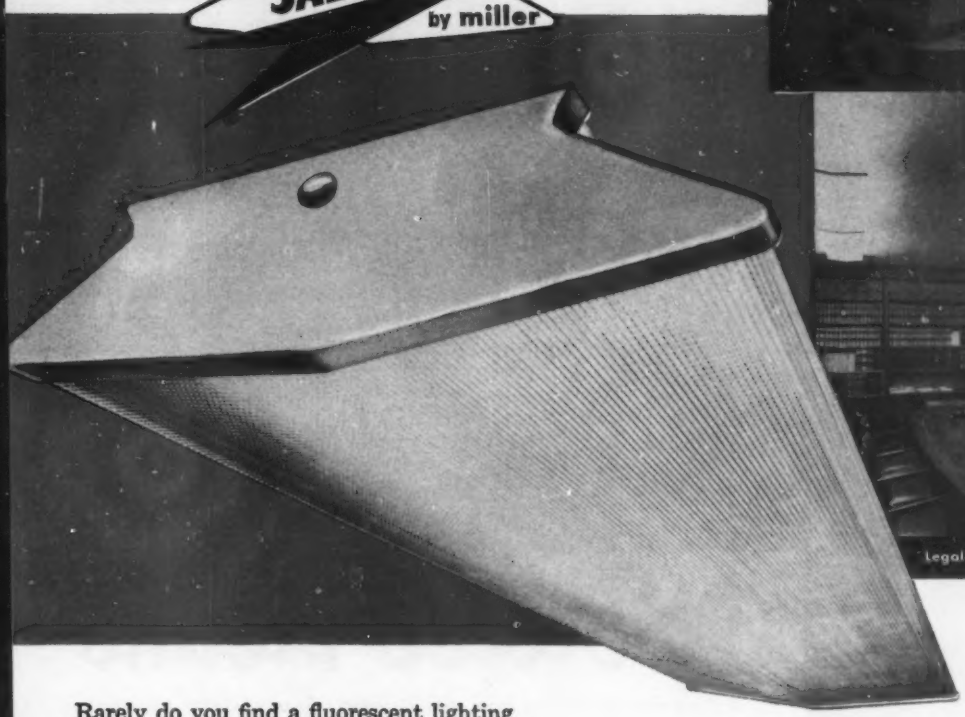
All articles will be given careful consideration and payment will be made promptly for all material accepted for publication.

Address all communications to the editor:

Electrical South
806 Peachtree,
Atlanta 8, Ga.

Distinctive Lighting at Modest Cost . . . for Interiors of All Types

SABRE* by miller



General Office Area

Legal Conference Room

Dental Office

Furniture Store

Rarely do you find a fluorescent lighting fixture that is *truly* distinctive. Occasionally, some measure of distinction is reached through appearance, lighting performance, or decorative effect produced. SABRE by Miller, however, achieves *true distinction* through a unique blend of *all* these virtues. And, it's available at modest cost.

SABRE is rapidly becoming one of the most wanted fluorescent fixtures in America. Pictured are just a few typical interiors where it is already doing a superlative lighting job. SABRE fits interiors of all types — large or small, new or old.

Styling with trim, crisp lines produces a sweeping effect and enhances decor . . . efficiency of 74½% means fewer fixtures needed per footcandle to make today's high lighting levels possible . . . one-piece, wrap-around refractor of prismatic, crystal clear plastic provides sparkle, with comfortable viewing from all angles.

For a lighted demonstration, contact your Miller distributor. And, for full catalog information on this unique fixture write Dept. 8959.

THE miller COMPANY • MERIDEN • CONN.

LIGHTING BY miller SINCE 1844

eye-fi

"Service means

A Statement of Policy from Jim Grindell, General Sales Manager
Killark Electric Manufacturing Company

We are proud of the position Killark occupies as the leader in manufacturing aluminum conduit fittings and fixtures. That leadership results from pioneering the use of aluminum, steadily expanding our line and following a dedicated policy of service to the contractor and wholesaler. Killark can give you these advantages.

1. *Long-term Experience.* More than FORTY-FIVE years' experience in the manufacture of conduit fittings, together with almost twenty years as exclusive manufacturers of ALUMINUM fittings gives us the "know-how" that comes with time and experience. Killark is the pioneer in this field.

2. *Modern Design.* We are continually improving design and expanding the line by adding new items. Aluminum fittings have definite advantages in that they are rust-free, more corrosion resistant, lighter and therefore easier to use.

3. *Complete Line.* Not just a few special-purpose products, but a *full* line in a complete range of sizes. In fact, Killark offers the most complete line of all-aluminum fittings and fixtures in the country today, and they are competitively priced.

4. *Efficient Distribution.* The United States and Canada are thoroughly and efficiently covered by 27 experienced Electrical Agents. More that half of these men have been with us 25 years or more. There are 20 strategically located warehouses from which prompt delivery is made, giving you faster service.

KILLARK ST. LOUIS

ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Aves. • St. Louis, Missouri

America's Most Complete Line of Aluminum Fittings & Fixtures

OVER 4500 ITEMS...

many things at Killark"...

SERVICED BY 27 KILLARK REPRESENTATIVES...

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BALTIMORE 27
Eastern Sales Co., 1561 Lister Rd.
BOSTON 27
Electrical Agencies, Inc., 49-51 "D" St.
BUFFALO
Eberhardt Electric Sales, 278 Johnson St.
CHICAGO 12
Jack L. Rowe & Son, 2039 W. Jackson
CINCINNATI 37
Arthur L. Ehlers Co., 1031 Meta Drive
CLEVELAND 14
Lusty-Thomson Co., 2140 Hamilton Ave.
DALLAS 2
Geo. E. Anderson Co., 1901 Griffin St.
DENVER 4
Kenneth B. Schumann Co., 1073 Galapago St.
DETROIT 14
Riecher Electric Sales Co., 8319 Mack Ave.
KANSAS CITY 8
Wm. B. Terry Organization, 616 W. 26th St.
LOS ANGELES 33
Kenneth Anderson Co., 123 South Myers St.
MILWAUKEE
Martin-Gaertner Sales Inc., 1108 North Third
MINNEAPOLIS 2
Harry P. Smith Co., 826-27 Andrus Bldg.
NEW YORK CITY 33
W. J. Wickenheiser Co., 600 West 181st St.
OMAHA
W. C. McConkle, 8115 Gold Ave.
PHILADELPHIA 3
Harry G. Anschuetz Co., 113-115 N. 23rd St.
PHOENIX
Kenneth Anderson Co., c/o Mr. Melvin C. Long, 422 S. 7th Ave.
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Crescent Sales Co., Inc., 4830 McKnight Road
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SAN FRANCISCO
F. M. Nicholas Co., 714 Harrison St.
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Northwestern Agencies, Inc., 4130 First Ave., South

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MacKay-Morton, Ltd., 2226 Dewdney Ave.
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VANCOUVER 9, BRITISH COLUMBIA
Griffon Sales Limited, 551 West 8th Avenue
WINNIPEG, MANITOBA
MacKay-Morton Limited, 183 James Ave., East

...AND DISTRIBUTED FROM 20 COAST-TO-COAST WAREHOUSES

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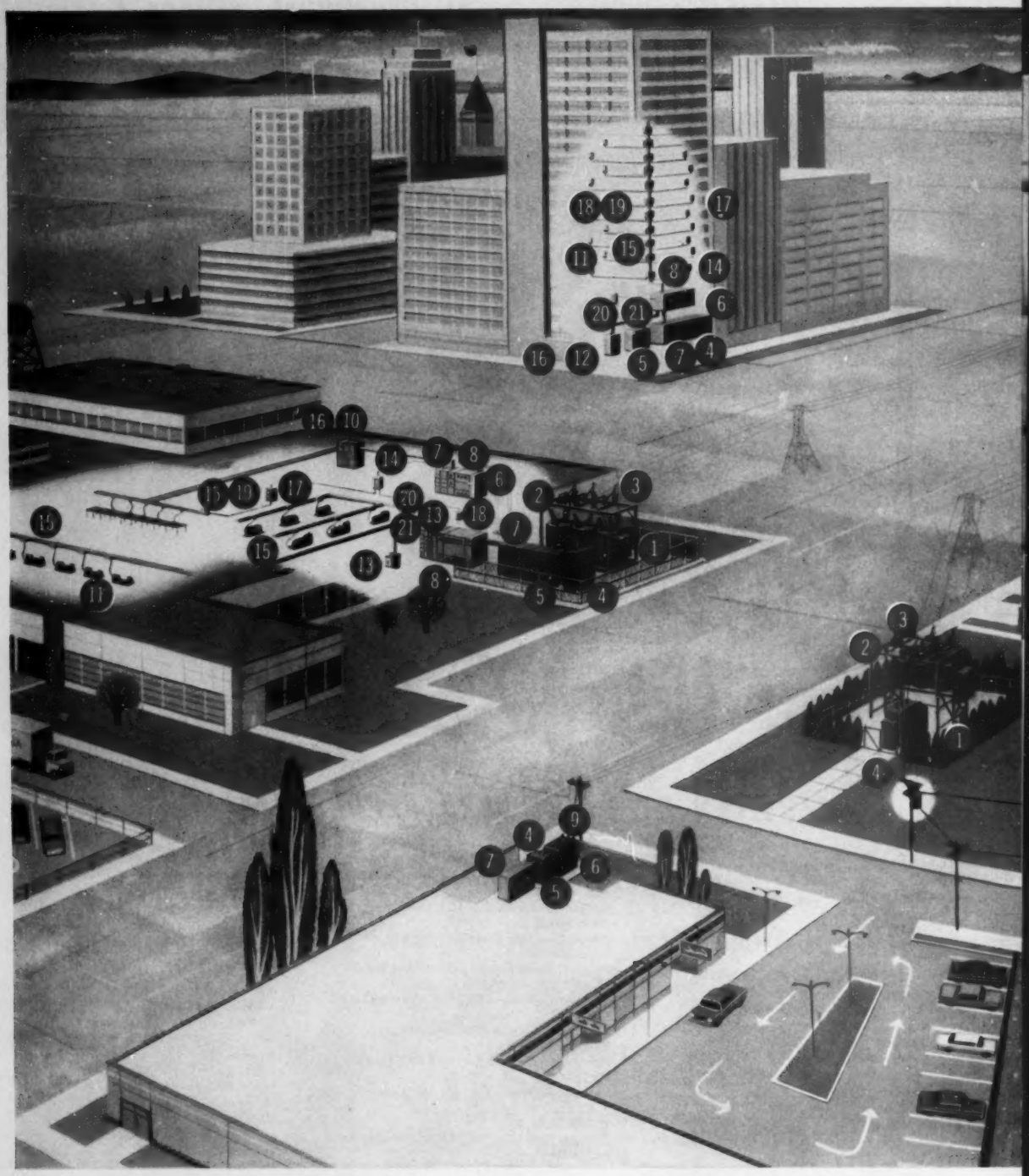

A complete line of quality electrical

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distribution and control equipment

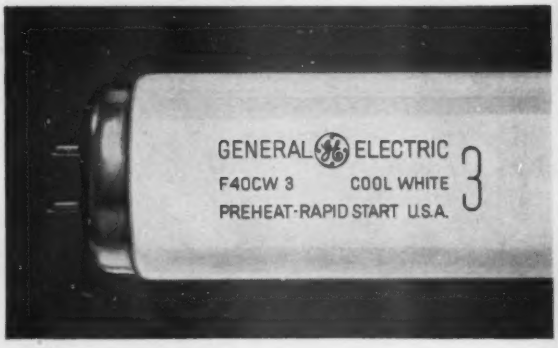
FOR HOMES, COMMERCIAL BUILDINGS, INDUSTRIAL PLANTS and UTILITY SYSTEMS

PERFOR

Number 1 reason why the best bargains

IN FLUORESCENT LAMPS, buying on price alone is no bargain at all. (Because the price of the lamps averages only 10% of the operating costs of light.) The other 90% goes for electricity and maintenance. Conclusion? The *best* lamp bargain works your customers' lighting dollar the hardest, gives the most *light* for their money.

How do G-E Fluorescents stack up? Take the popular 4-foot, 40-watt. The new General Electric PREMIUM 3 Lamp, announced in 1959, delivers more light per watt than any previous 4-foot fluorescents. As for maintenance—out of every 1,000 G-E 40-watt fluorescents you sell today, on the average 999 have no defect which can keep them from working—and 990 will still be burning late in 1961! Practically maintenance-free performance like this makes G-E 40-watt, slimline, high output and the exclusive Power Groove Lamps your customers' best bargains in fluorescent light.



IN MERCURY LAMPS, you have the source which can give customers the lowest cost of light of any type of lamp commercially available. Lower than filament—often lower, even, than fluorescent. *And General Electric Mercury Lamps, at any given time in their life, will outperform any other brand the same age* . . . and are built to last as long or longer!

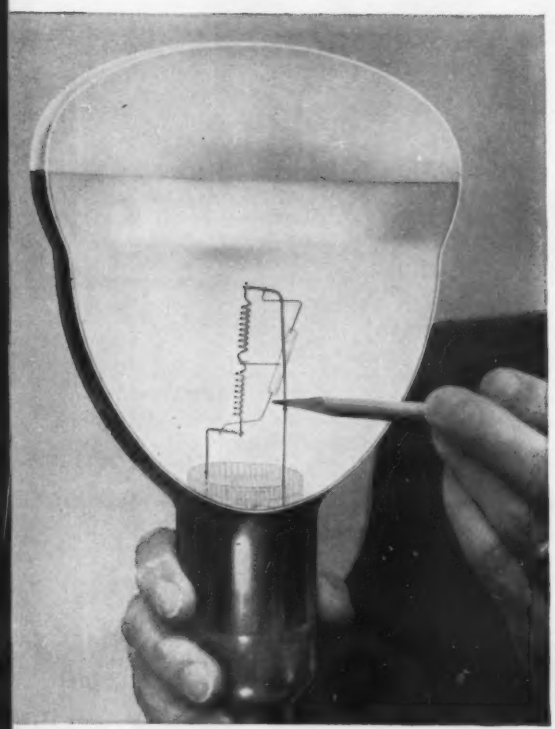
How? In many ways. To name a few—General Electric's dramatic new Bonus Line electrodes, better arc-tube design, and fewer parts to intercept light. And a new 1959 line of six G-E Bonus Line 400-watt Mercury Lamps are the *biggest* bargain in mercury light.

IN FILAMENT LAMPS there are some important differences between brands—some of which are detectable even *before* the lamp goes in a socket. Like the new 1959 smaller, brighter, 100-watt lamp bulb that's small as a 60-watter but delivers more initial light than two 60's. Or the new 1959 G-E Quartzline lamps that are pencil-thin but pack up to 1500 watts.

Or like the new 1959 RB-52 Bonus Line 1000-watt reflector lamp shown at right. Special bulge shape distributes heat, so a less-costly, regular glass is used—with savings passed on to your customers. And look! It uses General Electric's stand-up filament that delivers more light than ordinary "draped" type, has more expensive *silver* reflector instead of aluminum. It gives 20-30% extra light on the work plane. Big things are happening in G-E Filament lamps—all pointing to a bigger bargain in filament light for your G-E Lamp customers.

MANCE

in light are General Electric Lamps



IF YOU RECOMMEND REPLACEMENT LAMPS, then lamp selection is relatively easy. For new installations, however, the job is not often that simple. For this reason General Electric's corps of engineers, technicians and specialists are as near as your phone—to help you help your customers pick the right General Electric Lamp that'll give them the best bargain in light. They'll even aid in recommending the lamp type, size and "color" best for each customer's individual lighting conditions.

FREE FROM G. E. Right now... today you can get a startling new 20-page picture paper packed with factual information on lamps and lighting that can help your customers save big money. For your free copy just send your name and address to General Electric Co., Large Lamp Dept. C-931, Nela Park, Cleveland 12, Ohio. Be sure to ask for "FACTS OF LIGHT". See your G-E Large Lamp Representative for larger quantities.

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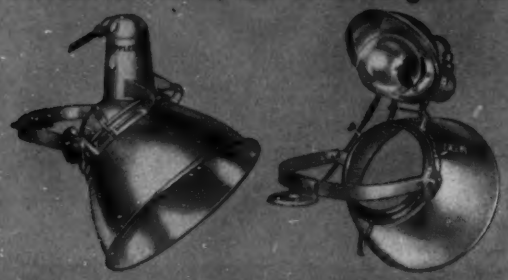
It's APPLETON® Industrial Lighting

for Higher Production • Fewer Rejects • Improved Employee Relations

"INTENSO" alzak* aluminum floodlights

FOR STORAGE YARDS, ATHLETIC FIELDS, and other large areas.



The Intenso Alzak* Aluminum floodlight provides high-intensity, trouble-free illumination year-round. Each light complete with 4-ft. cord. Available in 18" and 20" etched or polished reflectors, 20° to 90° beam spread. For 750-1000 or 1500 Watt PS-52 lamps and 400 watt Mercury Vapor lamps.

features:

- Split Second Rear Relamping – No tools needed . . . No nuts or bolts! Rear lid of lamp opens wide for quick, easy access. After servicing, just flip lid down and clamp!
- Rifle Like Aiming – Aim by looking through peep-sight, then lock in position! Horizontal and vertical locking degree calibrations in each unit!
- Weather-Proof – Due to impregnated gasket seal, unit is entirely weather-proof!
- No Condensation – Exclusive louver ventilation eliminates moisture collection!

* A proprietary term of Aluminum Company of America

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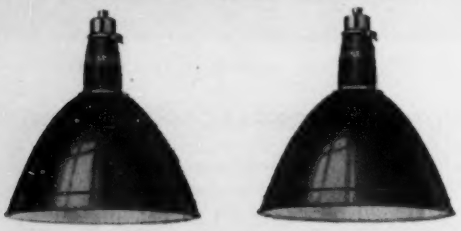
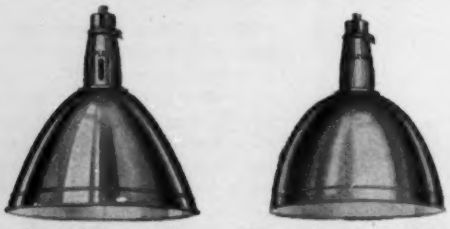
FOR ALL TYPES OF HIGH-BAY INSTALLATIONS.

PORCELAIN ENAMELED REFLECTORS



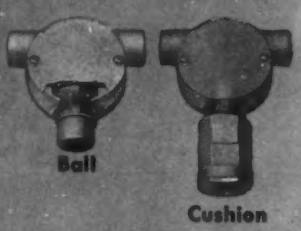
Ventilated Neck — Non-Ventilated Neck

PROCESSED ALUMINUM REFLECTORS



Ventilated Neck — Non-Ventilated Neck

TWIN HIGHLIGHT MOUNTING



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"AL" SERIES FLEXIBLE FIXTURE HANGER UNILETS

Pendant suspension from a universal joint enables 20° swivel in any direction and assures a plumb position. The cushion type provides spring suspension . . . absorbs shocks and vibrations.

This quality line of balanced Mercury and Incandescent Lighting Fixtures offers the time-saving APPLETON DISKONECT feature where both lamp and reflector are removed as a complete unit for easy cleaning without disturbing wires!

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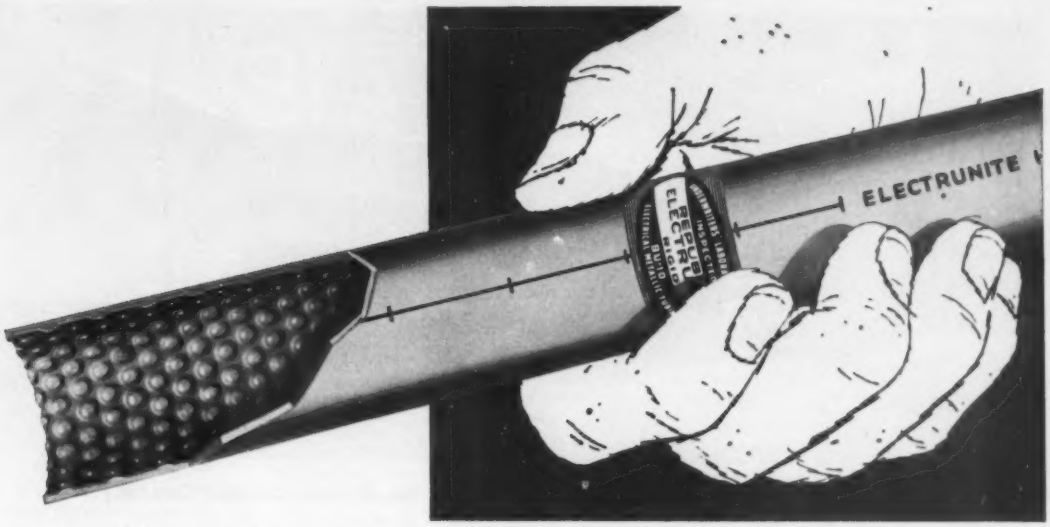

Republic ELECTRUNITE E.M.T. with SILVERSLICK
...wire pulling up to 37% EASIER...wire pushing easier, too

NOW...THE BEST COSTS EVEN LESS INSTALLED

SILVERSLICK is quick! New, improved Republic ELECTRUNITE® E.M.T. with SILVERSLICK inside finish makes wire pulling up to 37% easier. Wire pushing is even easier.

SILVERSLICK—the SILVER-colored, SLICK inside finish developed by Republic—combines with ELECTRUNITE's exclusive "INSIDE-KNURLING" to offer you greater installation advantages and economies.

SILVERSLICK helps wires slip smoothly, easily through the tube and roll over the knurling. Because contact surface and friction are reduced, wire pulling, wire pushing are easier.

In the laboratory, in the field, on the job . . . you've never had it so slick!

ELECTRUNITE works slick in concrete installations, too. ELECTRUNITE's tightly adhering galvanized coating protects against corrosion. It won't chip, or flake off during bending. No threading is required. Uniform concentricity assures snug fit of couplings and connectors—shutting out moisture and concrete.

Republic ELECTRUNITE E.M.T. offers complete wiring protection. It is approved in the National Electrical Code, is produced to A.S.A. Specification C80.3, and Federal Specification WW-T-806, latest revisions. ELECTRUNITE E.M.T. carries the Underwriters' Laboratories Seal of Inspection.

To learn more about the installation advantages and economies of Republic ELECTRUNITE E.M.T., call your electrical distributor. Or, send coupon today.

Try this DEMONSTRATION...

Take a sample length of Republic ELECTRUNITE E.M.T. with new SILVERSLICK inside finish. Insert a bundle of 25 pipe cleaners. Now, push-pull the pipe cleaners through the tubing. Depending on the type of wire coating, as many as three

Number 12's can easily be pushed through a 20-foot run of ½" Republic ELECTRUNITE E.M.T. with four right-angle bends. Ask your electrical distributor sales representative to show you samples with this new inside finish.

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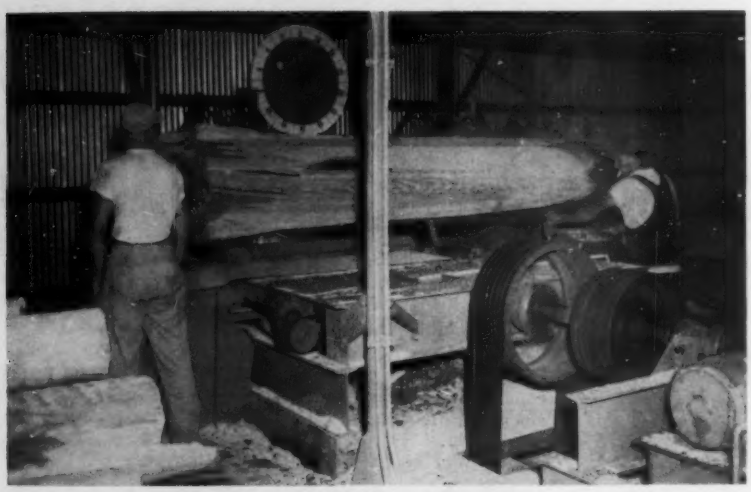
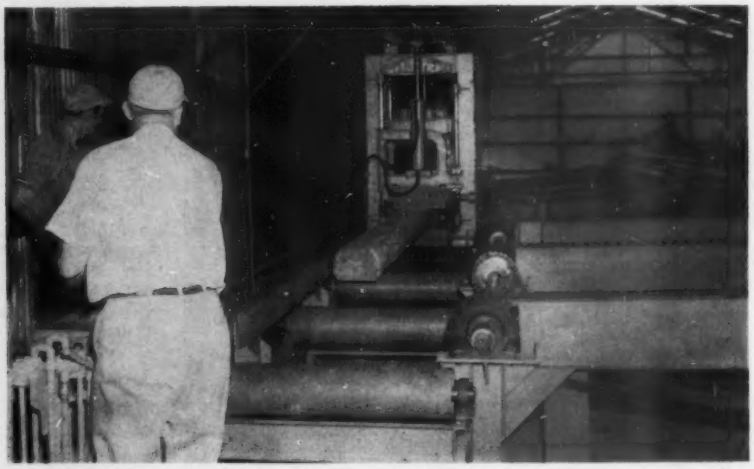
The completely automated sawmill of the Winston Lumber Company.



Operator of the headrig sits at the push-button controls (right) guiding the endless stream of logs which are being converted to lumber.

Contractor Wylie tests controls for the debarker and chipper.

Debarker control panel made up by Dixie Controls, Birmingham.



From headrig, cants move by conveyor chains controlled by gangsaw operator from same control station that operates saw in the background.

Another industry automates to contractors' advantage

By W. M. Massey

This article should be especially helpful to the following readers:

- Electrical Contractors
- Electric Utilities
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ THE BUSINESS of converting logs into lumber is one of the few major industries of the South that has run the gauntlet of power—waterpower, steam, diesel, and electricity. Recently several sawmills have begun automation, through electricity, that is destined to write a new chapter in the long history of lumber manufacturing, with resulting profit opportunities for the electrical contractors qualified in this field.

This automation of sawmills is not only a dramatic chapter for the lumberman but for the electrical contractor, also. One such fully automatic operation is the new sawmill of Winston Lumber Co., Double Springs, Ala. Henry J. Wylie of the Wylie Electric Service of Haleyville, Ala., who made the installation, is justly proud of a fine job as is mill owner W. S. Coats, who was an electrical engineer before he got into lumber business in 1945.

According to owner Coats, the purpose of the automation and its accompanying new equipment is to: (1) cut more lumber with fewer man hours per thousand board feet, (2) get more lumber out of the log, (3) upgrade the quality of the lumber produced, and (4) turn former waste into profits.

It is interesting to watch men casually push buttons on control boards to guide an endless stream of logs through the mill designed to produce 30,000 board feet of lumber per eight hour shift. A unique electronically controlled conveyor system moves logs through the mill with clock-work precision. From the time a log hits the receiving dock, it moves by conveyor through the debarker, up an incline deck, and through the various saws and trimmers—practically untouched by human hands.

As logs and lumber move through the mill, lumber scraps, slabs, and edging trim, converge from all parts of the mill to flow into the chipper which converts them to a product for paper pulp mills—an interesting operation, especially for the mill's bookkeeper.

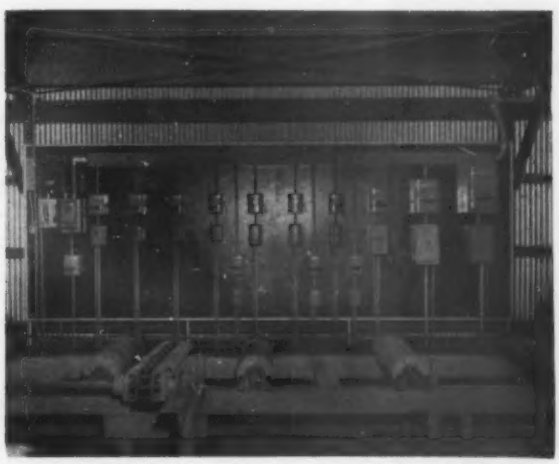
To perform the intricate operations throughout the mill there are 40 electric motors ranging in horsepower from 150 to three and each is operated by one or more remote controls.

These motors are fed from a 440-volt, 1200-amp, three-phase service. At the 1200-amp, six-fuse box, two circuits of 440 volts, 600 amps each, lead to panel boards on each side of the mill building.

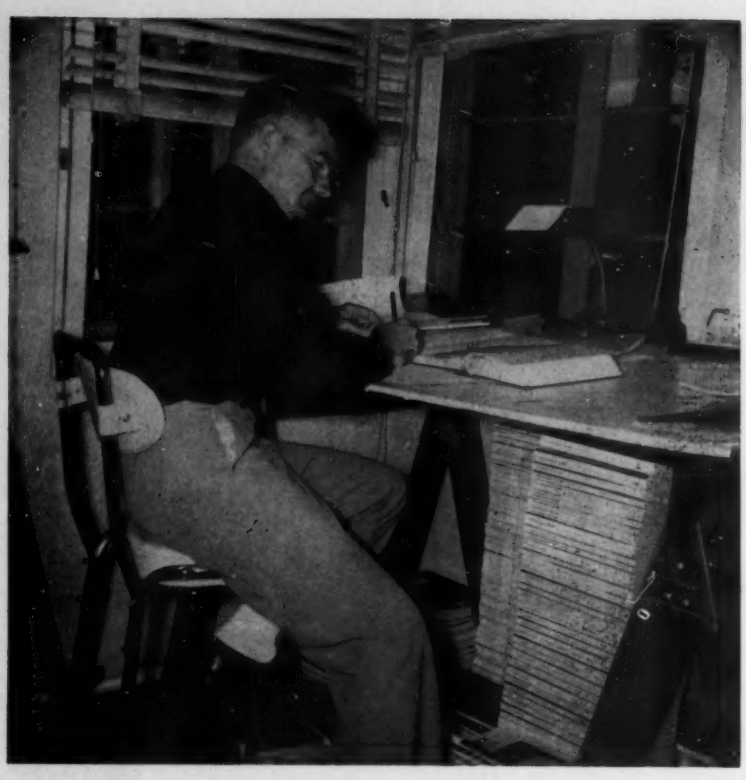
The panel on the log receiving side of mill includes switch box for headrig and gangsaw (each with starting compensator), carriage, log turner, headrig sawdust conveyor, cant transfer, infeed rolls to gangsaw, gangsaw sawdust transfer, inclining log deck, infeed conveyor to chipper, and slab conveyor from trimmer.

(Continued on page 139)

Panel board serving saws, debarking, and chipping operations. At right is control for the gangsaw.



Panel board on the back side of mill carries lighting circuits and controls for edging and trimming.



Electrical Engineer Culbreath Whitehead, Jr., urges every contractor to learn more to earn more. He advocates keeping up with modern devices and new techniques through the study of available literature.

Boost your knowledge to make business boom

By Culbreath Whitehead, Jr.

Consulting Elec. Engineer
Bradenton, Florida

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✓

◆ IN SELF-DEFENSE, today's electrical contractor needs to learn more about the numerous electrical products increasingly marketed today, if he is not to woo a subservient category among his fellow contractors or be the low man on the totem pole of the electrical industry in his chosen trading area!

In view of the numerous controls of increasing complexity which contractors are called upon to install and service, the days of the screwdriver mechanic are over. Very much to be deplored is the reluctance of some contractors to taking enough time out from figuring little jobs, and getting the material together for them, to take a book home and burn a little midnight oil boning up on new equipment circuitry and installations.

A comprehensive knowledge of new developments is the open door to a vast profit potential. In fairness to himself, today's contractor needs to keep on top of electrical developments, because too often, lack of such knowledge can lead to costly job delays.

For example, the fancy buildings coming off architects' drawing boards feature such wide expanses of glass as to make it difficult if not impossible, to install conventional wiring like conduit, EMT, Romex, etc; because there simply is not the room on a glass wall or door or mullion to place the wiring or switching arrangements.

A practical solution is often found in the substitution of low voltage remote control because this and the accompanying wiring and switches are easier to install in cramped quarters. Recognition of these factors results in their application by alert contractors.

On the other hand, there are contractors who have not taken the effort to become thoroughly acquainted with low-voltage work. As a consequence, they are prejudiced against it by reason of their frustrating experience with former jobs. These contractors avoid this work entirely or, anticipating trouble, bid so high as to let it most assuredly go to the more learned competition. Yet a little pre-knowledge would have landed them the job, and they would have had the satisfaction further of making a neater and far better job at perhaps a lesser cost than that involved in conventional installations using surface-mounted conduit, etc., along with surface-switching.

The alert contractor needs to learn the theory of operation of the devices he installs, especially the newer types, if he is to do himself any good profit-wise.

For example, even though today's fluorescent lamps with their rapid or instant start features are less complex than the older lamps, it is still a common sight to witness some electricians standing in bewilderment when it comes to trouble-shooting. They replace the starters; the ballasts, the tubes, and, with their trouble-shooting lore based on hearsay and not personal study, they delay the job and run up needless expense for the customer.

Had they taken the trouble to thoroughly understand the circuitry of these fixtures, the symptoms alone would have helped

(Continued on page 136)

Aluminum in home construction

This article should be especially helpful to the following readers:

- **Electrical Contractors** ✓
- **Electric Utilities** ✓
- **Electrical Wholesalers** ✓
- **Electrical Inspectors** ✓
- **Industrial Engineers**
- **Consulting Engineers**

◆ ALUMINUM'S versatility in home construction has been demonstrated in a builder's model home in Wheaton, Md. It was built by Washington, D. C., area builder W. Evans Buchanan, who worked closely with Kaiser Aluminum experts in selecting the 21 aluminum products used. The model home is called the Woodlark model, and is in the moderate price bracket.

Taking advantage of aluminum's light weight, ease of handling, and high efficiency, the electrical system of the house makes wide use of the metal. Rigid aluminum conduit was employed to provide protection for service entrance wiring. This conduit ranges in sizes from ½-inch to six inches, and, since it is lighter than steel, provides easier and less expensive handling and installation.

Heating and air conditioning ducts of aluminum were used throughout the Woodlark. Its high reflectivity, smoother surface, and better air flow efficiency afford aluminum ducts a delivery capacity that has been estimated to be 15 per cent greater than a system of galvanized duct the same size. These ducts, when used for air conditioning, do not require internal protection from moisture condensation.

The kitchen of the Woodlark model home contains an all-aluminum kitchen range hood, a type which can be obtained in a variety of finishes, plain or embossed surface, and in anodized colors.

Light fixtures in brushed aluminum help to carry out the theme of aluminum in many applications. Fixtures such as those used are available in a number of finishes, colors, and styles that will fit into the decorating schemes of the modern home builder.

Among the 21 items used are several new or improved aluminum products, including Bermuda roofing, soffit material, and vented end gable siding. These innovations were developed as a result of studies of builder needs in solving specific construction problems.

The Bermuda roofing panels,

(Continued on page 139)

Practicality and economy of aluminum in home construction were demonstrated in this builder's model home erected in Wheaton, Md. The moderately priced Woodlark contains 21 aluminum components, including electrical conduit and heating and air conditioning ducts.

Electrical system of the model homes includes light fixtures in brushed aluminum, which are available in a variety of colors and styles.

Carolina's four-hour subbid plan

By Hurley E. Badders

This article should be especially helpful to the following readers:

Electrical Contractors ✓
Electric Utilities
Electrical Wholesalers ✓
Electrical Inspectors
Industrial Engineers
Consulting Engineers ✓

◆ A PROGRAM worked out between general contractors, subcontractors and material suppliers in the two Carolinas is bringing about the curbing of unethical practices in the industry: namely bid shopping and bid peddling.

The program, a "Four-Hour Subbid Plan," is set up with a list of terms which participating members have been following to a letter. Electrical contractors in the area played a big part in the formation of the plan.

Under agreements of the "Four-Hour Subbid Plan," subcontractors and material suppliers must have their subbids in the hands of general contractors four hours before the general bid filing time. It has been agreed that general contractors need a lead-in time and the four hours was approved by all concerned.

Now, general contractors participating in the plan will not accept subbids from any subcontractor or material supplier after four hours before the general bid filing. Subbidders, however, can submit their bids to non-participating general contractors at any time.

The first "Four-Hour Subbid Plan" in the Carolinas was organized in Charlotte, N. C., in 1957. It has now spread to nearly every section of North and South Carolina, with several hundred members. It has been a highly successful plan.

The plan is sponsored and officially sanctioned by the Carolinas Branch, Associated General Contractors, the construction industry's trade association in the two Carolinas. It is a prime example of what industry itself can do to solve its own problems.

Results have been:

(1) General contractors now have plenty of time to compile quotations.

(2) General contractors receive firm quotations from subcontractors and suppliers.

(3) Subcontractors and suppliers know their prices will not be revealed to their competitors.

(4) Trust and understanding has developed between the generals and the subs and both are doing a better job of construction with the utmost skill, responsibility and integrity.

(5) The public's welfare is better protected and the public receives better construction prices.

Officials of the AGC feel the real significance of the plan is that an industry as large as this one is able to solve its own problems without outside or governmental prodding of any sort. They have solved a moral and ethical problem the only way it can be solved —not through legislation but through mutual trust.

There are several things set forth in the "Code for Ethical Practice and Procedure for Receiving Subbids" for members of the "Four-Hour Subbid Plan."

For the general contractor, it sets forth:

(1) He will not solicit bids from any subbidder unless he is prepared to give that subbidder the job, should the subbidder be low bidder and able to perform the contract.

(2) Will award subcontracts whenever practicable to the lowest subbidder at that subbidder's original bid price. If, however, the general contractor is compelled by the architect to award the subcontract to other than the low subbidder, or should the general contractor determine that his best interest will be served by award to other than the low subbidder, such award will be at the original subbid of the subbidder to whom the subcontract is awarded.

(3) May disregard unsolicited bids.

(4) Will not, at any time prior to general bid filing, divulge to anyone outside his own organization any information pertaining to subbids received. He may, however, after the time limit for receiving subbids, discuss any subbid he has received with the subbidder offering such subbid.

(5) Will not accept subbids after the time limit previously established, whether or not the subbidder is a signatory to this agreement.

The code for the subbidder:

(1) Will not attempt to change his price or to modify his bid in any way after the time limit for receiving subbids. He may, however, withdraw his bid at any time prior to one hour before the time for general bid filing.

(2) Will not see or receive information concerning the amounts of other subbids before the time for general bid filing.

(3) Will not, after one hour before the time for filing general bids, withdraw his bid or, for any reason, refuse to enter into a subcontract with any general contractor to whom he has bid, if such subcontract is offered to him at an amount not less than the amount of his bid.

(4) Will make his bid complete and in accordance with the plans and specifications. He will, insofar as possible, give separate bids on the various items which he quotes. If, however, he offers only a lump sum bid combining the prices of several items, he may not offer to "break down" such a bid after the time of receiving subbids. Nothing contained herein shall be construed to mean that a subbidder cannot make a combined bid if he so desires.

(5) May bid to general contractors who are not signatories to this agreement in any manner and at any time he may see fit.

There are also stipulations which say any party in the agreement may resign at any time by writing. It further says nothing is to be construed to mean or indicate that members cannot have business dealings with generals or subs who are not members.

While there are some of the latter, the majority of generals and subs in the two Carolinas have accepted the plan and are liking it well.

Contractor William Goodman (right) explains to a prospect a newly completed electrical installation.

A picture is taken of every job before work is begun and also after the installation is completed.

Photographs aid installation planning

By William A. Goodman
William Goodman Electric Co.
Riverdale, Maryland

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers ✔
- Consulting Engineers

Contractor William Goodman shows a prospective customer photographs of electrical services that he has installed for residential heavy-ups.

◆ WE HAVE FOUND that a camera to take pictures of our more complicated jobs is of great value. A photograph's accurate record of the existing installation and available surrounding space and its inclusion of all details on an existing service have proved our present system superior to any procedure we have yet used.

When we go into a residence where a more complicated job will have to be done, we take a picture of the existing service. To help in computing space, we place a small blackboard with a 12-inch ruler attached to it in the picture. The blackboard with the name of the homeowner, his address, and the size of the service is used to identify the picture with the job for future reference. In close jobs where space is very limited, the 12-inch scale is especially important.

Accurate records

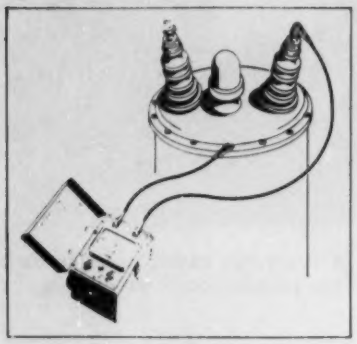
Upon our return to the office, we place tracing paper over the picture and sketch in the connection box and the switch that are to be added, indicating full dimensions. It is always simple to check back with a drawing or a picture if any question arises.

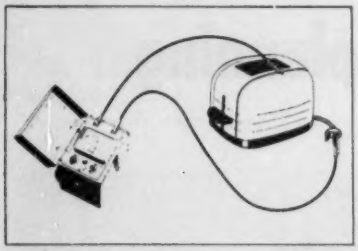
The drawing gives the mechanic explicit directions so that he understands the existing set-up, what is to be added, and how the finished installation is to look.

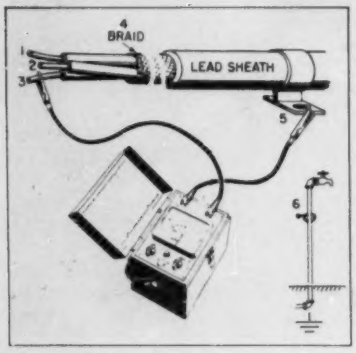
For example, we take a picture of a service entrance conduit, meter connection box, and existing service equipment. On our tracing

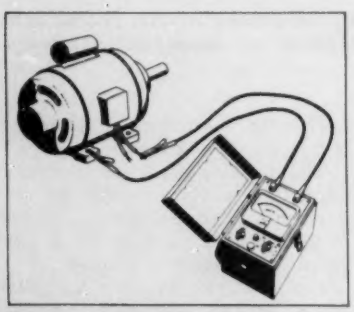
(Continued on page 138)

Periodic insulation tests predict failures of plant electrical equipment









How insulation resistance tests are made on these various types of electrical equipment.

By Richard W. Inman

Executive Vice-President
Associated Research, Inc.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers

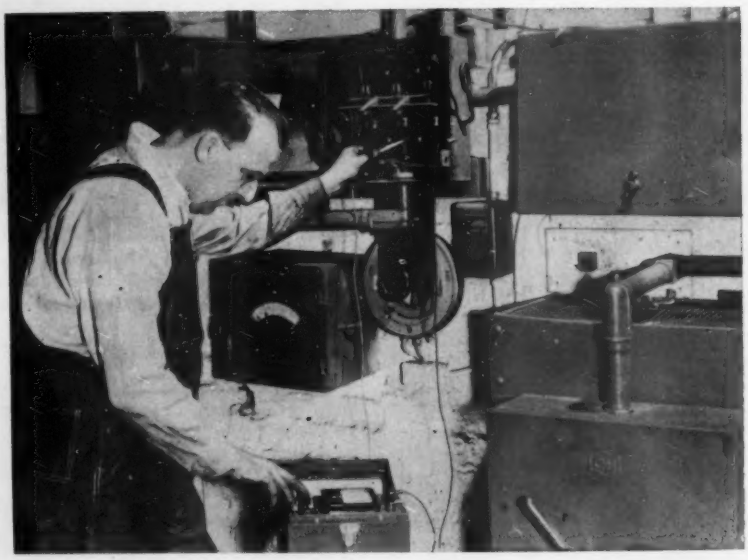
◆ ELECTRIC POWER companies maintain extensive programs of preventive maintenance through periodic insulation resistance testing of transformers, cables, bushings, and switchgear. They have found these inspections predict the failure of electrical equipment, thus saving substantial expense from failures under conditions of load and preventing interruption of service to their customers.

For the industrial customer of the utility, similar periodic insulation tests can be of equal importance. The utility engineer who endorses such testing, aids the power user in prevention of severe damage to equipment and cuts losses from lost production.

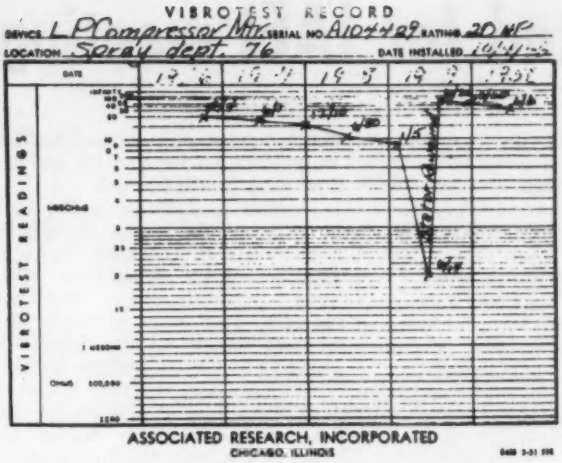
Low cost, easy-to-use resistance measuring instruments and a system of simplified record cards are now available that are very practical for even the smallest plant. These can save many times their cost by preventing a single destructive breakdown under operation of a motor, generator, power cable, heater unit, or other piece of industrial equipment.

The effectiveness of this method may be readily assessed by considering its application to any one of the dozens of electric motors to be found in every plant.

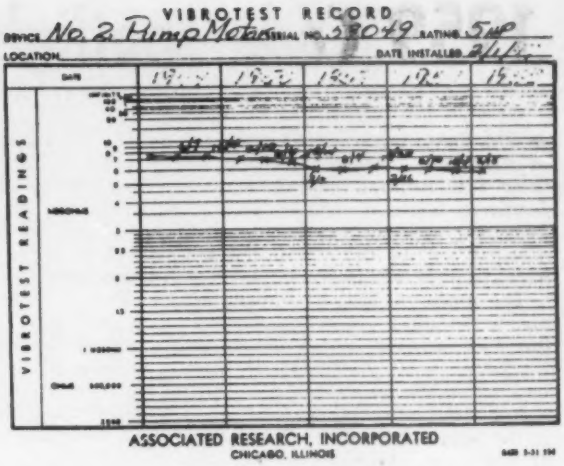
The electrical insulation of a motor is subject to severe stresses, even under normal operating conditions. When the cold motor is



Periodic tests of insulation resistance at distribution board with the Vibrotest Megohmmeter predict breakdown of insulation at circuit breakers, switches, and in distribution cables and bushings.



This test record tells story of motor aging normally. Readings taken over succeeding years show a gradual and normal decrease of insulation resistance.



In this test decrease was normal for two years and then a periodic check showed a sharp drop. Stator winding was replaced and motor again tested normal.

started, its insulation is also cold. As the motor heats so does the insulation, expanding under the temperature rise and contracting when the motor is shut off. This can be compared with the effect of ice freezing in pipes. Though on a smaller scale, the ultimate strain on insulation can cause short circuits or serious power losses.

Dirt is one of the greatest enemies of insulation. Almost all casually collected dust, lint, airborne grease, and other deposits are electrical conductors. As they penetrate the minute cracks and faults in insulation of motors, and other electrical equipment, the insulation deteriorates. Likewise, moisture contributes to the destruction of insulation. When a motor that has been running is stopped, as it cools, moisture is drawn into the insulation about the windings.

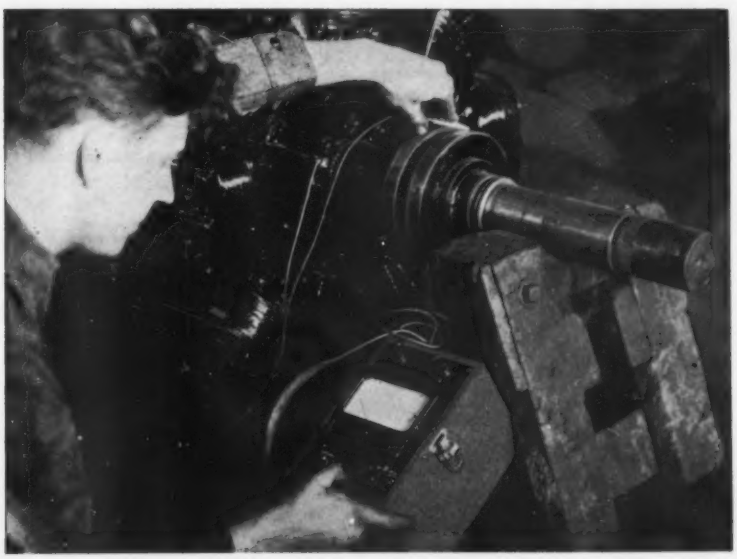
Measurement of the resistance is the means for observing change or deterioration of insulation. If simple records are kept, accurate prediction is possible of insulation failure and breakdown of operating equipment. The insulation resistance in ohms or megohms of electrical equipment does not tell the full story unless comparison is possible with insulation resistance readings of the same device over a period of time. Two motors, for example, of the same horsepower, same make, and same age, may have substantially different insulation values, yet both be in safe operating condition.

Change in resistance

Of utmost importance for purposes of preventive maintenance, is the change in resistance, particularly acceleration in the lowering of insulation resistance. A simple system of record keeping for each piece of equipment will graphically indicate important changes in the insulation resistance, if tests are made at uniform intervals and under similar conditions of operation, temperature, and humidity.

The Vibrotest Record Cards, as illustrated, have been used for many years in many plants and have proved quite satisfactory as a guide to preventive maintenance of electrical equipment. The horizontal lines show Vibrotest readings taken at dates which should be written in across the top of the chart. By plotting each test on this chart and joining the test readings with a line, a graphic indication of the history and likely future of the insulation resistance of that particular device, will be developed.

(Continued on Page 140)



The Vibrotest Megohmmeter measures resistance between motor windings and ground in order to predict breakdown and to avoid costly interruptions of service as well as damage to rotating parts.

1959 Code spotlighted for IAEI meeting

◆ THE INTERNATIONAL Association of Electrical Inspectors will hold their 31st Annual Meeting of the Southern Section, October 12, 13, 14, 1959. Headquarters for the meeting will be the Hotel Heidelberg, in Jackson, Miss.

The main business of the meeting will consist of discussions of the 1959 edition of the National Electrical Code, with its many textual and editorial changes. In anticipation of some of the problems in the application of this Code, the program is planned to include guest speakers on items of topical interest in relation to inspection problems.

Adequate time periods have been allotted for Code discussion and study of inspection problems under the leadership of Frank Camus and Ben Segall as moderators and a Code panel of nationally recognized authorities in their respective fields. To simplify the presentation of problems to the panel, a correlating committee has been appointed to correlate and clarify questions on the Code. Question forms will be available to members at a station at the entrance of the meeting hall.

Reports on activities of chapters, sections, and Code committees will be scheduled at appropriate periods during the conference. Members have received notices of the IAEI executive council proposed amendments to the Articles of Association. These changes will be acted upon at the annual meeting. Members of the executive committee are to meet at 3:00 PM, Sunday, the 11th of October, and there will also be a chapter secretaries meeting at 7:00 AM, Tuesday the 13th. It is hoped that chapters will arrange for a full attendance of these officers.

One feature of the meeting will be the displays of the latest in electrical materials, devices, and equipment. Leading electrical manufacturers will be represented.

A social hour is scheduled for Sunday evening, the first night of the meeting, and a banquet and dinner dance will be held the evening of Tuesday, the 13th. A ladies program is planned to provide entertainment during business sessions and will include trips to spots of local interest, shopping excursions, and other activities.

T. W. Sampson, Jr., has been named to serve as general chairman for the meeting, and Mrs. A. W. Hardin, president of the Ladies Auxiliary of the Mississippi Chapter will serve as chairman of the ladies entertainment committee.

This will be the first time in eleven years that the Southern Section meeting has been held in Jackson. The Hotel Heidelberg Hotel, which will be the headquarters for the meeting, is located in the heart of the city on Capitol Street. It is near the shopping district, theatres, churches, auditorium, and the city hall, an old landmark from the Civil War days. Jackson, the capital of Mississippi and the "Cross Roads of the South," offers visitors and tourists an interesting blend of the old and new deep South culture.

Located in Jackson is the University of Mississippi School of Medicine and Teaching Hospital. This combined with four other large hospitals has developed Jackson into one of the major medical centers of the South. In addition to the University Medical School, Jackson is richly endowed with three liberal arts senior colleges and one junior college located in the metropolitan area.

Geographically Jackson is located in the center of the Southern Section. Therefore, it is hoped that attendance will be larger than for any previous meeting.

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OFFICE OF THE MAYOR
JACKSON, MISSISSIPPI

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MAYOR
PAST PRESIDENT
AMERICAN MUNICIPAL ASSOCIATION
PAST PRESIDENT
MISSISSIPPI MUNICIPAL ASSOCIATION

August 4, 1959

Mr. C. B. Grauer, President
Southern Section, IAEI
P. O. Box 1790
Jackson, Mississippi

Dear Mr. Grauer:

We are so glad to know that the Southern Section Annual Meeting, IAEI, will be held at Jackson, Mississippi, October 12-14, 1959.

This is a most important meeting to cities throughout the South. It affords electrical inspectors and electrical code-writing groups an opportunity to combine their efforts in perfecting methods by which electrical installations, repairs and changes are made.

We want our electrical inspectors to attend these sessions because it is good training and helps to keep them up-to-date in code changes.

Jackson is a very friendly, modern, progressive city with adequate facilities to take care of your convention needs. We assure you we will do everything we possibly can to make your stay here a memorable one.

It is sincerely hoped that it can be arranged for electrical inspectors throughout the South to attend this annual meeting specifically planned by the International Association of Electrical Inspectors.

Please accept this invitation because we really want you to come.

Sincerely yours,

Allen C. Thompson

Allen C. Thompson
Mayor

ACT:eea

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We invite you to learn more about the "decorator" and other Mears electric heating controls. Call your local distributor, or send coupon (right) today for informative catalog.

EASY TO INSTALL

Extra-strong base can't warp at time of installation. Can be installed over rough plaster or mud rings and uneven walls without hindering performance or destroying appearance. Easy to adjust control knob.

Plenty of room for connecting power and lead wires. Screw type terminals make it unnecessary to loop ends of wires, make it easier to connect wires in less time, assure a more positive connection.

Face panel easily painted to blend with walls.

The Sleek, Slim, Modern Mears "Decorator" Thermostat . . . compliments classic or contemporary interiors . . . and at the same time is superbly engineered for exceptionally accurate control of electric heating. Quick response is assured because this sensitive instrument has a full perimeter of air space between wall and thermostat. Perforated "decorator" face plate allows radiant heat to strike the sensing element. Snap action switch (the electrical switch everyone's used to) assures no TV or radio interference, longer life. You and your customers are assured accurate, dependable temperature control backed by Mear's *18-month warranty.*

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Swan Island, Portland 17, Oregon
Please send your catalog on the new "decorator" thermostat and names of suppliers in our area.

Name_____
Address_____
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Profession_____

Power tools for smaller contractors

By Ruel McDaniel

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ Use of power and labor-saving tools is far from being the exclusive prerogative of the major electrical contractor. It is not necessary to be big in order to use these tools profitably, according to the experience of Acme Electric Co., Port Lavaca, Texas, owned and operated by W. M. Van Buren.

For example, the company obtained the electrical contract on the new $1,000,000 Calhoun County (Texas) court house, and for this job Mr. Van Buren bought an additional power hack saw for use in laying 6,000 feet of floor duct. The new hack saw saved enough in labor to pay for itself before the job was finished.

"I don't recall ever having bought a new tool to speed up work in general or on a specific job that did not pay for itself within a year," Mr. Van Buren emphasizes.

The company employs seven electricians regularly (plus extra men on specific, larger contracts). It owns about $20,000 worth of power and hand tools, thus providing about $3,000 worth of labor-saving equipment for each electrician employed.

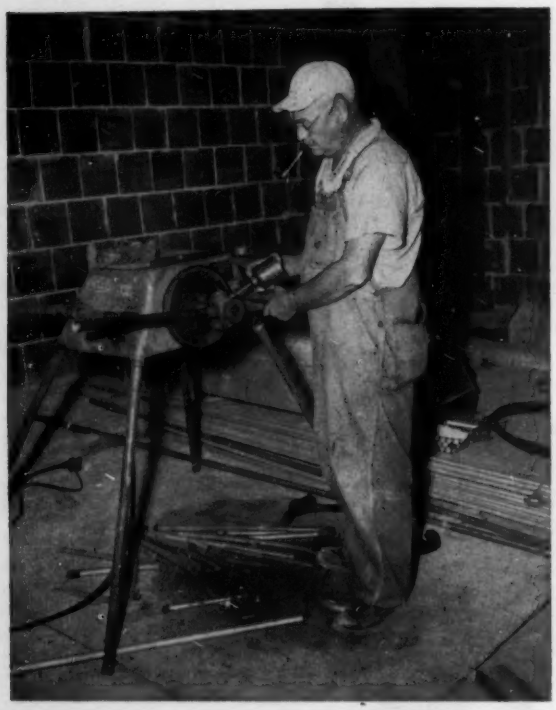
A tool that is busy during much of the day on the average job is the power pipe vise, which reduces labor costs tremendously on even a comparatively small job, Mr. Van Buren declares. "We take it from floor to floor, or from one section of a building to another, wherever the men are working," he says, "and not only reduce time involved in the various mechanical operations the vise performs but also eliminate time involved in going to a central area to obtain the finished units or in having them finished off by a vise centrally located."

The portable vise serves frequently to cut, ream, and thread pipe up to two inches in diameter, and because it is portable, it does the work generally within a few yards of where the materials are to be used.

A power nipple chuck, located at the tool shed on the site of the job, makes and threads nipples as needed and saves the time that would be utilized otherwise by going to the shop to do the work or saves money if the items would have to be bought already threaded.

The company owns three hydraulic benders so as to provide

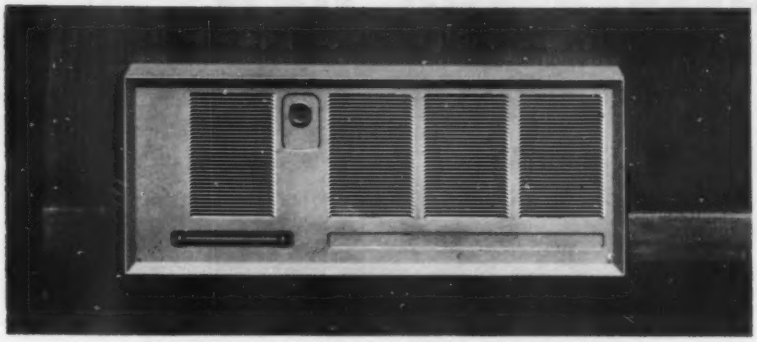
(Continued on page 58)



Foreman George Brake threads pipe on the portable vise unit for the Calhoun County court house job.

This ten-foot portable scaffold was very helpful in hanging ceiling fixtures on the court house job.

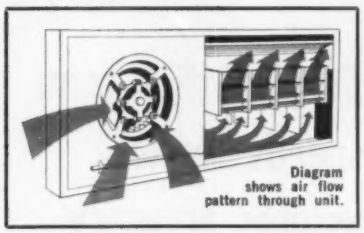
New R&M-Hunter Baseboard Unit Makes Electric Heating News



ONLY 33 INCHES LONG, 13 INCHES HIGH, 3⅞ INCHES DEEP
Mounts against wall finish or may be recessed in stud space

Best comfort results from combining features of Baseboard and Forced Air Heat

The benefits of powered circulation plus the ideal system of lower level temperature control combine to produce lowest cost comfort. By recirculation of air concentrated in the lower three feet of the room—the yardstick zone—heat is directly utilized by the occupants of the room. There is no wasteful overheating of outer wall or ceiling surface to speed up the heat loss and needlessly increase the cost of heating. You use all of the heat you pay for.



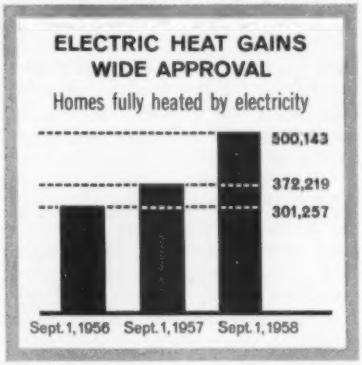
Floor-Level Thermostat Guards Comfort. Cold air sinks to the floor immediately. The R&M-Hunter Forced Air Baseboard knows the minute that a door or window has been opened and responds instantly. Cold or cooling floor air is whisked into the unit by a quiet centrifugal blower. It is forced over the heating elements for fresh warmth and delivered directly into the "living zone" at comfortable temperature. Air is never super-heated so as to escape wastefully to the ceiling. Positive, powered control of circulation at low levels mixes the tempered air with room air immediately. Outer wall and window areas are kept at or near room temperature for economical operation.

SAFE SURFACE TEMPERATURES

The big volume air circulation holds operating temperatures to a level that is perfectly safe for little children. Each unit is equipped with an automatic safety thermal overload switch to prevent overheating in case of any unforeseen blockage of air circulation. Will not discolor fabrics that can be ironed with "medium heat" setting.

Safe, Easy to Clean. Built-in safety switch automatically cuts off power to both blower and heating elements when front panel is removed. No need to throw master switch for periodic cleaning. With front panel removed, all parts are easily accessible to blower attachment of vacuum cleaner. Power connections are automatically restored when front panel is secured in position.

Requires No Oiling. Sealed bearings with life-time lubrication eliminate maintenance nuisance. No periodic oiling required. Quiet, efficient blower operation assured at all times.



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AUTOMATIC—DUCTLESS FORCED WARM AIR HEAT APPEALS TO BUILDER, HOMEOWNER

Construction and operating economies are responsible for the widespread enthusiastic acceptance of R&M-Hunter Forced Air Baseboard. The compact dimensions save valuable floor space. No heating closets or chimneys required. Eliminates bulky duct work. Limits the number of subcontractors involved in new construction.

OPERATING EFFICIENCY, "ZONE CONTROL" POPULAR

With thermostat control in each room, you completely eliminate that hard-to-heat room problem. It is never necessary to overheat one area of the home to achieve comfort in another. Individual rooms may be maintained at temperatures best suited for the activity of that area without disturbing the temperature of other rooms.

A sudden change in wind direction or addition of sun heat through a window are immediately compensated for within the room where change occurs. This gives true operating economy, impossible to achieve with a single, centrally located thermostat.

Units are available with or without built-in thermostat. A single thermostat-equipped unit will control two or more Forced Air Baseboard units in a single room.

UNITS ARE IDEAL FOR COMMERCIAL BUILDINGS, TOO

R&M-Hunter Forced Air Baseboard units available in sizes from 1,000 watts to 3,000 watts for residential use. Up to 4,000 watts for use in schools, offices, institutions.

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Contractors tell how

Three simple rules land big jobs for small electrical contractor

By R. E. Phillips

Phillips Elec. & Appliance Co.
North Little Rock, Ark.

◆ A SMALL CONTRACTOR who continues to land big jobs in the face of competition by large contractors must operate by some rules he has set up for himself. I am one of the "little fellows," doing business in a small shop, manned by three electricians, and governed by three rules that help me to go after those big jobs successfully. My three rules helped me to get the electrical contract for the 394 houses I am wiring now in the Lake Shore Development at Hot Springs. They aided in landing three other recent jobs for 150 houses each.

My three rules are so simple that, at first consideration, they seem too simple. But they work for me. Here they are:

1. Sell quality
2. Start the day with a clean, well-fitting work uniform
3. Buy from one wholesale house.

Whether I am bidding on a large job involving thousands of dollars or a remodeling job for a single house, I stress quality materials and quality work. Maybe I put extra emphasis on this because it sparks my own enthusiasm to help me sell and take my little organization beyond cold facts and figures.

My rule of a clean, attractive uniform to start the day makes me and my men feel professional and look professional. I believe that a sloppy uniform influences people to think that the wearer does sloppy work. Since I stress quality work, I feel that the impression I create must start with myself and my electricians. The clean, starched, perfectly laundered uniform I get into each morning really does something for my morale. It actually helps me to think big. The contractor who has this mental attitude is not afraid of going after the big contracts.

R. E. Phillips, right, discusses a job with one of his men. He strives for quality from the planning stages to the completion of every job.

That third rule concerning buying from one wholesale house is a good one to stick to. The wholesaler knows that I am going to give him all my business and that I never shop around. Therefore he gives me the breaks. I get better service, more consideration, and better prices when I land a big job.

I value regular customers. An electrical contractor can be something like the family doctor. Having won his customer's confidence, he is always called when work is needed. My three rules help me to hold my customers. In the twelve years I have been an electrical contractor, I feel that I have enjoyed more than the average amount of repeat business.

Any electrical contractor can become a skilled estimator. After he has done three or four big jobs, he can become something of an expert. Estimating skillfully helps the contractor to make more money, especially when he is backed by a good wholesale house that gets all his business. But estimating does not get those repeat jobs. Quality does that. I put quality into every job and make the customer understand it. When that customer pays me for my work, he feels that he is paying for quality.

Unlike some electrical contractors, I find dealing with women prospects easier than dealing with men. Knowing little or nothing about electrical work, they are interested in what I say about quality. At this time I am doing some profitable work rewiring houses for air conditioners and electrical dryers. This is a field hardly scratched in this area, and I think I can look forward to some profitable years ahead. My three rules work for me here, too.

Simple office form speeds service, assures accuracy

By Harry Miller

◆ A TRIPLICATE form for use between foreman and the office or electrical suppliers, prevents duplication of effort, saves the time of typing endless requests, and expedites the movement of material to job sites.

It also speeds up the answers to problems the foreman may encounter on the job.

"The 'speed letter' takes the place of a regular and lengthy message or office communication," says Russ McMichael, foreman for Pope Electric of Albany, Georgia.

"The form contains a white, yellow and pink copy separated

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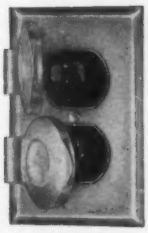

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by carbons. I simply write my message on the white sheet and send it to the office or the supplier. I pull the yellow sheet for my own records and send the pink page along with the white message. The pink page relays the answer to me, and the white one is sent to the supplier from whom the material is to be obtained. That way a minimum of office detail is necessary, and the material or advice wanted is quickly sent to the job."

Office and shop tailor-made for electrical contractor

By George Watson

◆ AN OFFICE and shop which seems tailor-made for the progressive electrical contractor is that of the Hacker Electric Co., Guntersville, Ala. W. L. Hacker, proprietor, is a graduate engineer who for several years was with TVA. He drew his own plans for his place of business which "seems to have everything."

The Hacker building is located on a corner lot, 50 by 120 feet in size. The building is 25 feet by 100 feet in size, divided equally into offices and shop. It is constructed of concrete blocks, painted and waterproofed, with an ornamental front which consists mostly of Roman bricks and slanting glass show windows. A roof canopy extends over the front entrance, and the entrance door is also set back slightly.

Hacker handles no electrical appliances, so the front half of his building is given over to offices, a service counter, and to a display of electrical fixtures. A series of shelves are provided for the latter, which include about everything needed for wiring and lighting including switches, switch plates, circuit breakers, extension cords and light globes. Mr. Hacker finds that a lot of this material is sold simply by having it out where it can be seen. Often the customer does not know the name of the item he wants, and it helps to have it out on the shelves.

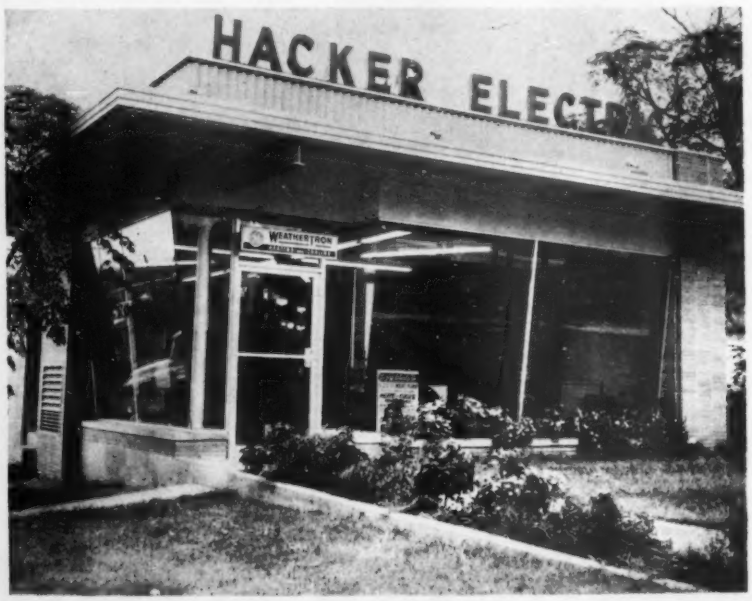
Since Mr. Hacker is a Weathertron heat pump dealer he uses one to heat his own place of business. It is installed out front where it advertises itself. The fluorescent lighting out front is of unusual design, controlled by a low voltage switching system. A master panel, near Mr. Hacker's office, shows whether the lights are on or off. This as well as the heat pump installation are used for demonstration purposes. Also on a wall near Mr. Hacker's office is a map of the area with pins to show where more than 40 heat installations have been made to date. Red pins indicate residential and blue pins commercial installations.

In addition to Mr. Hacker's private office, equipped with a drawing table and also another board on which to lay out large blueprints, the secretary's office is out front, rimmed by a service counter. A desk and table are provided on the other side of the building for the job superintendent. It is here that staff conferences are held daily, and usually customer interviews are conducted there, also. Close by is a water cooler.

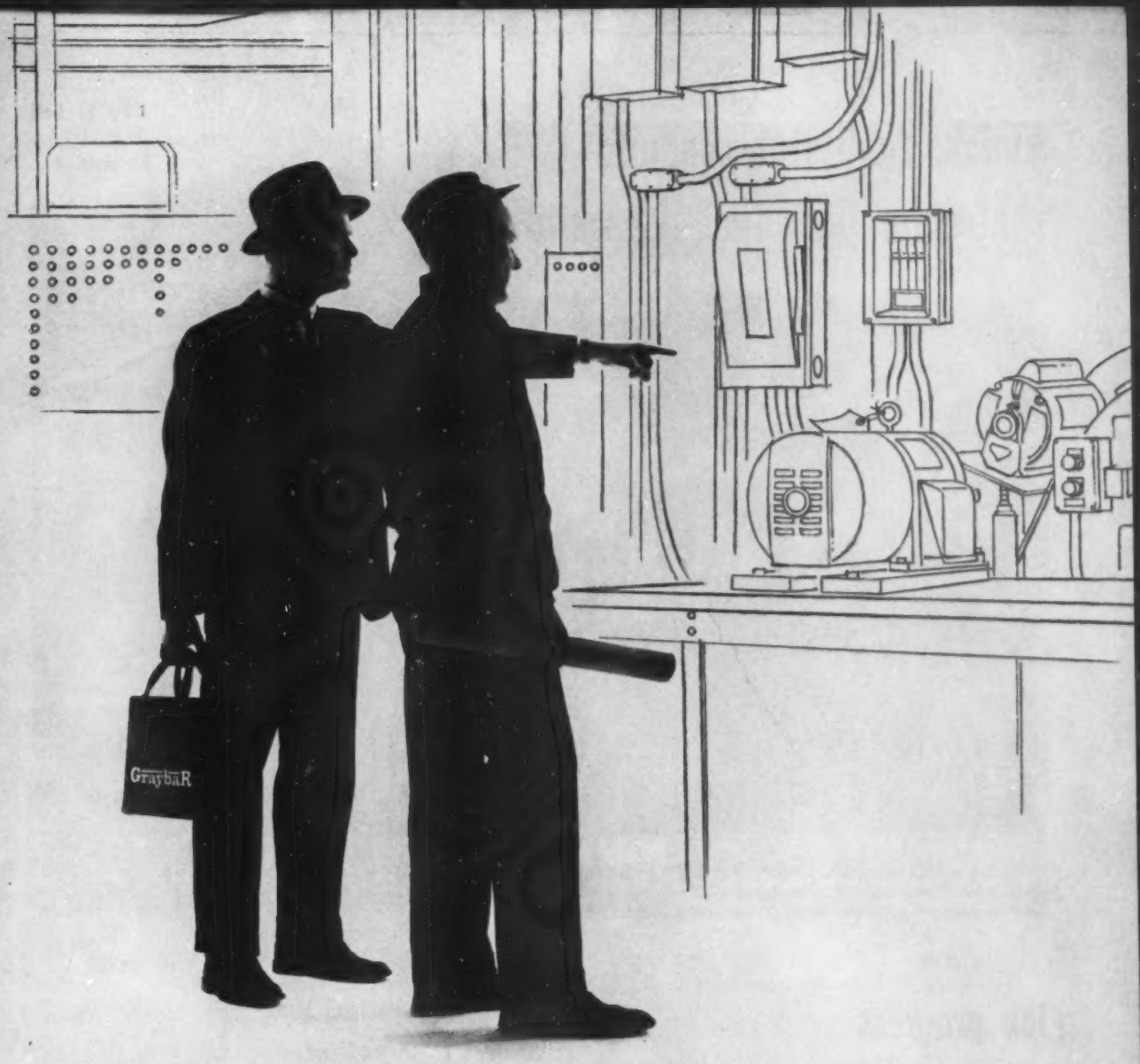
The back shop is 25 by 50 feet in size, including a concrete loading dock at the rear. Along one side of the shop is a long work bench with test board. On the other side are material bins. The shop has a concrete slab floor.

The appeal of the Hacker shop is its attractiveness, enhanced by a nice electric sign on top, and its inclusiveness, so far as facilities for an average size contractor are concerned. Mr. Hacker has taken into consideration the probability that his concern will grow and has built walls that will take a second floor in the future, or he can extend his building over the inner half of his lot. He originally had plans for a basement in his building and wishes he had included it, as he already needs extra storage space.

Mr. Hacker is located in the heart of the TVA territory where there is much development. His business now is mostly of a residential nature, but as industry develops he will probably take on larger jobs, necessitating more space. However, for the present he has a very fine shop, one that would be "a dream" for many contractors. Mr. Hacker said he would be glad to show it to any contractor planning such an improvement.



Exterior view of the home of Hacker Electric Co., Guntersville, Ala.



"Simple enough change and really cuts installation time"

You hear comments like this quite often when the Graybar Specialist joins an electrical contractor on the site.

The Graybar Specialist, backing up the salesman who calls, is there to work out the best installation method, to select equipment that's exactly right for the job, or show how to get the most from a special new tool.

He's well qualified to make this kind of assist, too. He's had years of training on the job and by the book. Working out a better way is almost second nature to the specialist.

And remember, he's just one of several members of the Graybar electrical contractor service team. The others: the Graybar Field Salesman, Inside Salesman and Counterman. Their job is to *speed your work . . . reduce your costs . . .* help you *build your business.*

The Graybar service team is ready to work for you. Call them in. 916

Graybar Service includes: Objective recommendations. On-the-job technical help. Most complete lines. Planned stocks to meet your needs. Expert counter service. Speedy handling of will-calls.

GraybaR

ELECTRIC COMPANY, INC.

Everything Electrical GraybaR ELECTRIC COMPANY

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • OFFICES IN OVER 130 PRINCIPAL CITIES

Finish, don't stub conduits— contractor finds that it pays off

By Si Bell
Electrical Contractor
Sarasota, Fla.

No pipe is left as a stub. Each one is tied into its box or panel, thus avoiding later finishing. Contractor Bell has found that this practice pays off in labor and time savings for his electrical business.

WE HAVE found it pays off in less labor and time to abandon the conventional practice of stubbing conduits, capping them, and later nippling them out to their boxes or panels.

We do no more stubbing, All pipe is brought up to its terminus in switch box, junction box, or panel; and the boxes or panels are set right on and finished up. This saves two threads required when you nipple up from the stub to the box. It saves a coupling, and in many cases you can start with a 10-foot length of conduit or tubing, bend it up to the correct height, then finish the run, including the panel.

Otherwise, if you stub, it means a return trip to finish every pipe run. It is very easy to run a string line at 48-inch center height of boxes and set all the pipe runs to it. In every run of pipe above 100 feet, we install a fishline at the time the run is finished. The line only costs about a dollar, and it saves its cost many times over when it comes time to pull the wire in.

We have had cases where we did not install a line, and, by reason of bends, etc., in the pipe run, hours have been wasted trying to shove a fishline through.

Job progress pictures, helpful as training aids

By Jack Stone
President
Jack Stone Co., Inc.
Arlington, Va.

◆ WE TAKE pictures of jobs in progress and completed jobs with two purposes in mind: first, the pictures are used in brochures and other promotional material prepared for customers; secondly, they are used for education of our new personnel, particularly junior engineers, with regard to field problems. *(Continued on page 58)*

Pictures serve an educational purpose. Here equipment is axle deep in soft terrain, and a crawler type of vehicle has gone to move it.

THEN
.. and NOW
Since 1950, Southwire has grown from 10,000 to 250,000 square feet—an independent wire and cable manufacturer with skilled manpower to match the most modern equipment available.
SOME THINGS NEVER CHANGE AT SOUTHWIRE

Sure, a fellow may have to walk a little farther from his car to the plant, or use the telephone to get information instead of stepping into the next office for it — but at heart we're still a small plant in a small town, waiting anxiously for each order and eagerly watching its progress through the mill with care and pride.

We're still Jim, and Jack, and Dave, and Pete—to our customers and to each other. The order for a thousand pounds of copper wire is still important to us. And it gets the same personal attention as one for a million and a half pounds of ACSR transmission cable.

True, constantly expanding product lines, larger and more modern facilities, and continuing research programs, are added reasons for doing business with SOUTHWIRE . . . but personal attention, dependable service, and quality products, are the things that have built our business and will continue to make SOUTHWIRE a good place to trade.

SOUTHWIRE serves the world

Southwire® Company

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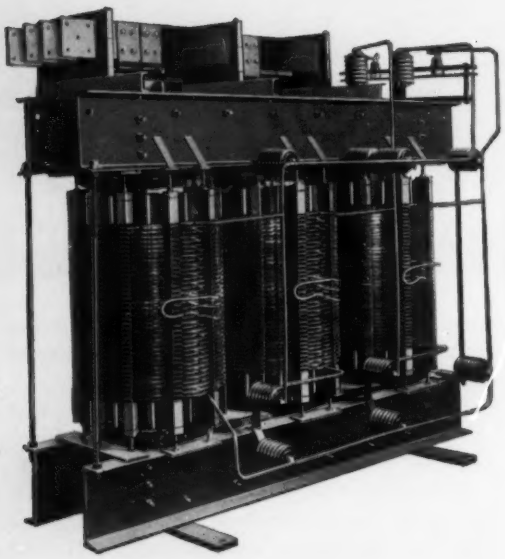
• Bare and Weatherproof Copper and Aluminum Line Wire • Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper Aluminum and Triplex • U.R.C. (DBWP, TBWP) Copper • Copperweld® Conductors • Copper and Aluminum Building Wire • ACSR and All Aluminum Cable • Galvanized Steel Guy Strand and Static Wire • Aluminized Steel Guy Strand and Static Wire • Aluminum Alloy Wire • Cable Accessories • NM Sheathed Cable

ALSO FABRICATORS OF COPPER AND ALUMINUM FOR WIRE AND CABLE MANUFACTURERS

Your plant . . . building . . . equipment depend solely upon the transformer

SORGEL
SOUND-RATED DRY-TYPE
TRANSFORMERS



2000 Kva 3-phase 15 KV transformer, core and coils only. Illustrating disc type continuous windings without splices and substantial supports of all terminations.

The dry-type transformer is the heart of your entire electrical distribution system. Its continuous, reliable and economical performance is vital to every operation . . . from heavy machinery and production equipment, to the air-conditioning and light in your office.

SORGEL sound-rated dry-type transformers assure you of . . .

Time-Tested Reliability . . .

Nearly half a century's experience in the development, manufacturing and application of transformers, in world-wide use.

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Place at any convenient location near the load center . . . reduce long feeder runs . . . provide greatest economy.

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Originators of low sound level. Sound-rated up to 10,000 KVA. Lowest core and copper loss, resulting in minimum operating costs.

A Complete Line . . .

¼ KVA up to 10,000 KVA. 120 volts to 15,000 volts. Also transformers for special applications and saturable reactors to regulate and control electric power.

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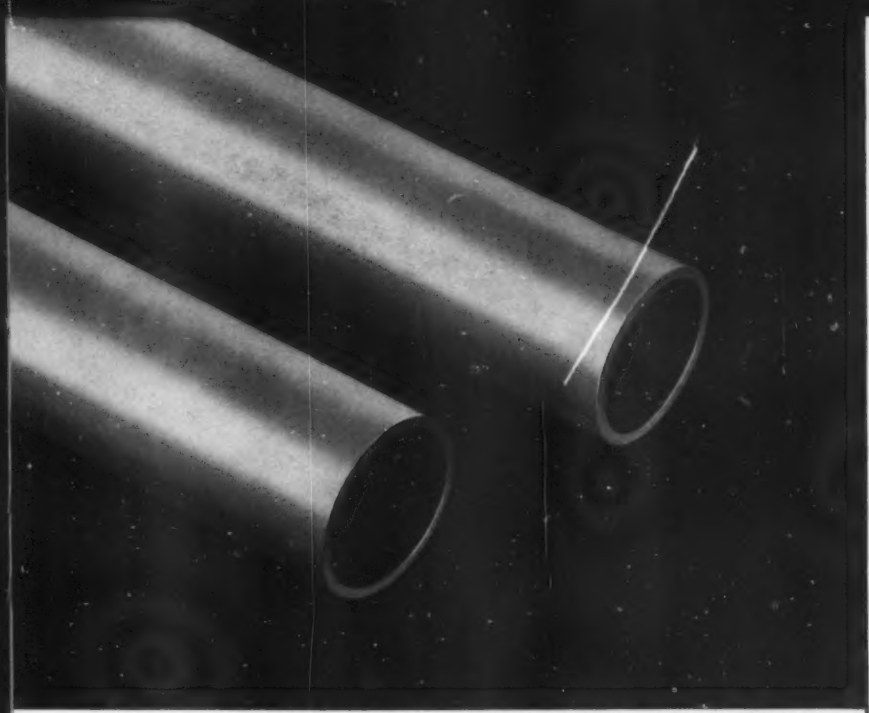
Consult the classified section of your telephone directory or communicate with our factory.

THE LARGEST AND OLDEST EXCLUSIVE MANUFACTURER OF DRY-TYPE TRANSFORMERS



Hard galvanized finish for durability; polished satin lustre for lasting good looks.

Even EMT can look good ...if it's CIRTUBE* EMT

TRUE, the first things you look for in EMT are: one, is it easy to work with—two, is it made to give lasting protection. CIRTUBE EMT, by the way, rates tops on both. But there's no reason why EMT can't *look* good as well!

That's where CIRTUBE EMT "shines," too. Reason for its pleasing polished satin lustre is the cyanide zinc plating process Circle uses (even though it costs a little more to apply than other methods).

The zinc bond is better, too—won't chip or flake off. That's because Circle employs elaborate cleaning processes to make sure that the steel is absolutely clean before plating.

Quality finish is only one of many reasons why CIRTUBE EMT has gained such wide acceptance in so short a time. Why not try it next time you order—you'll like it.

*Trade Mark

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. SALES OFFICES & WAREHOUSES: In all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT *Ask for it!*

Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built in lubrication for easier wire pulling.

Split-free, bead-free! Induction welded CIRTUBE EMT, left, proves stronger than ordinary EMT, provides easier fishing.

Automated quality control! Automatic controls assure complete and continuing uniform quality of product.

Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.

You can count on ***Amp-trap**** . . . when you want to stop a 500,000 Ampere short circuit dead in its tracks. In fact, if ***Amp-trap*** is watching and waiting at your entrance switches or in your circuit breakers — you couldn't be safer. That's why those who know *insist on and get* ***Amp-trap***.

**Protected for your protection by 27 patents.*

Amp-trap is *"always awake at the switch"* . . . where current limitation with high interrupting rating is required . . . on general power circuits, on DC circuits, on standard and the new higher voltage networks, on busways and entrance switches, even on general electronic circuits.

Amp-trap is a true current limiter because it anticipates and stops dangerous short circuits long before they can become destructive. Nothing takes the place of ***Amp-trap***. There's one for every purpose. Ask for Bulletin 514-9.

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Amp-trap® – *Awake At The Switch*"

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Subsidiary of I-T-E CIRCUIT BREAKER CO., Philadelphia, Pennsylvania

REGISTERED U.S. PATENT OFFICE Est. 1893

Amp-trap® Tri-onic® t-d Renewable C-Q-T® TRIONET® ONE O-T TUBE

Progress photos

(Continued from page 54)

The accompanying picture points out more strikingly than we can describe it the adverse effect of weather and ground conditions on equipment used for off-road construction. Here equipment is axle-deep in soft terrain and is inaccessible by any means other than the crawler type of vehicle which has gone in to salvage it. Happenings such as this add significantly to the cost of a job.

The picture demonstrates lack of know-how and lack of coordination between office and field personnel. It makes a vivid impression which alerts personnel against taking equipment into swampy land.

Power tools

(Continued from page 48)

one wherever men are working on a contract. This permits pipe to be bent to fit the specific use at the moment the bent pipe is needed. The bender cuts labor costs by saving time otherwise necessary to take the pipe elsewhere for bending.

There are several gang boxes, with work-benches built on top, for use on all jobs, large or small.

The company cuts the time required for hanging overhead lights and stringing lines overhead by use of light-weight portable scaffolds. These scaffolds are 10 feet long, and they paid for themselves on the court house job alone. There they were used for stringing the standardized eight-foot ceiling lights throughout the building.

The company has such labor-saving tools and equipment as plaster groovers, masonry drills, stud fastening guns, electric grinders, and electric welding equipment. These tools are portable so that it may be moved quickly from job to job or from one area to another. Other time and labor saving tools such as electrical testing meters, metal hole saws, megohm meters, and the customary hand tools are kept in the electrical contractor's shop.

"If a piece of equipment is a sound investment for a large contractor, it is just as sound for the small operator," Mr. Van Buren declares, "so long as he has contracts on which he can use the equipment." Lack of proper labor-saving and time-saving equipment can easily make the difference between a profit and loss on even a

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WEAVER
PARALLEL GROOVE CLAMPS
ni-cad* COATED!
The weatherproof NICAD coating (over a hi-strength aluminum body) keeps any bi-metal connection troublefree, come what may: Heat, cold, salt, alkali, you name it!
They eliminate trouble caused by... (1) Oxidation of Cu against Al; (2) Unequal expansion or contraction of lines and clamps during severe temperature changes. Contacts stay tight—no arcs.
NO SEPARATE INSERTS TO CATCH MOISTURE AND CAUSE CORROSION! NO SOLDERED JOINTS!
Permanent Low-Resistance Connections
WRITE FOR SAMPLES FOR TESTING
Five sizes now available (NI-CAD coated or non-coated) to cover all requirements.
*Extremely heavy coating of cadmium and other corrosion resistant elements
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J. A. WEAVER Company

ROYAL "POWR-KORD"

There's a Royal "POWR-KORD" for every need:

- RUBBER or VINYL
- BLACK or RED (rubber)
- RED or YELLOW (vinyl)
- HANDY LENGTHS — from 10' to 100'
- IN THESE TYPES and SIZES:
  #18 and #16 SJ — 2- and 3-conductor
  #18 thru #12 S — 2-conductor
  #14 and #12 S — 3-conductor
  #18 and #16 SJT — 2-conductor

. . . the all-quality line of all-purpose heavy-duty extensions

Here's the kind of rugged construction that pays off on the job: MOLDED-ON caps and connectors, — built-in strain reliefs — Royal-quality cord — heavy brass blades and double-wipe contacts — locked-in-place molded construction . . . and FULLY UL LISTED!

Next time you're ordering electrical supplies from your wholesaler, be sure to include Royal "POWR-KORDS".

ROYAL ELECTRIC . . . an associate of UL

ROYAL ELECTRIC CORPORATION
Pawtucket, Rhode Island

REPRESENTATIVES:
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small contract, and unless the small contractor has the equipment necessary to do a job as economically as the large operator, he has little or no chance of competing with him in bidding on even a small job."

Most of the equipment in the Acme shop was purchased for a specific job on a specific contract, and in most cases the equipment paid for itself during the lifetime of the contract for which it was bought. "When you can do that, you're out ahead if you use the equipment on subsequent jobs," Mr. Van Buren points out.

Mr. Van Buren maintains a simple record system that is easy to keep and requires only a small part of the bookkeeper's time.

In the office is a card for every piece of equipment—hand-tools as well as power units. The card carries sufficient data to make identification of the unit comparatively easy. When certain items are to be used on a specific job, the bookkeeper issues them to the contract foreman and checks them out under his name. Thereafter they are his responsibility until they come back to the shop and he has been given a receipt or a release on them.

How the foreman handles the issuance of the equipment after he has assumed responsibility for it is largely up to him. In most instances, however, the foreman maintains his own card system and requires an electrician to sign for a piece of equipment when he takes it from the job shack or from the truck, as the case may be. When a man signs for a tool, it is his responsibility then to see that it gets back to the foreman. Otherwise it is charged against him.

In the case of a sizable contract, the company moves a portable tool shack and field office onto the job site, and the electricians are encouraged to return checked-out tools to the shack at the end of the day, where they are locked up for the night.

"What sort of tool record the contractor keeps is secondary in comparison to the accuracy of it," Mr. Van Buren stresses. "No system is good unless it is kept right up to the minute. Otherwise when a foreman or electrician says he has returned a missing tool, you are never certain whether he did or not. If the records are kept up-to-the-minute and accurate at all times, they are better than the word of any man when it comes to determining the responsibility for a missing tool."

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New Smithcraft Speedomatic troffers are packed with features that save hours and dollars for you! Wonder hangers and double-fast screws. Installs in seconds from below with screwdriver. Built-in dimensioning gauge. Telescopic door frame assures perfect fit, even in irregular ceiling openings. Large wiring access door. Only 4 15/16" deep, plenty of room for utilities. Large wireway end openings. Safety-locking door frame hinges. Four basic types fit over 100 ceiling systems. Packed two to a carton, with or without door frame installed. Compare the contractor-minded Smithcraft Speedomatic and see for yourself why Speedomatic is today's fastest-installing troffer.

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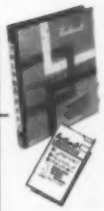

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Light-conditioning by Smithcraft—America's finest fluorescent lighting

IDEAL THE HELPING HAND ON EVERY WIRING JOB

Mr. Contractor:

Guessing is for Games...

Not for Choosing Wire Connectors-- the Most Critical Part of Your Wiring Job!

No electrical system is any better than its poorest connection. Why risk a splice that's less than the best—for your customer, the job and *your profits?*

Look at it this way: Just one bad-splice call-back can cost you more than 1000* perfect IDEAL "Wire-Nuts". That's one reason why *more* "Wire-Nuts" are used by *more* contractors than any other connector . . . with extra quality and safety proved by more than 33 years of on the job experience, and *billions* in service . . . You can pay *much* more, but you can't get a better, longer-lasting connection at any price. BE SAFE and STAY SAFE with IDEAL "Wire-Nuts".

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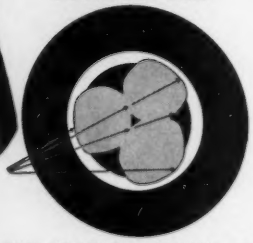
CONNECTORS



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Screw-and-lever and wedge action with FORCE UP TO 2½ TONS flattens wires and multiplies contact area.

All contractor sizes are listed as pressure cable connectors, for general use (600 V.) in branch circuit and fixture wiring.

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CONCRETE TIGHT
One piece, solid tubular steel—cannot open or spread—cannot leak sand or water. Far surpasses U.L. Requirements U.L. File Card E24788.

EASY ASSEMBLY
Exclusive pre-set, staked screw with deep slotted head for easy working in the tightest areas required. No backing out when inserting conduit.

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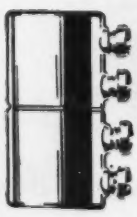

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Floor boxes are an assembly of special 1½" or 2⅛" deep, 4" octagon outlet boxes and covers, with bronze adjusting ring and floor plate. Large hand hole opening for roomy access to wiring.

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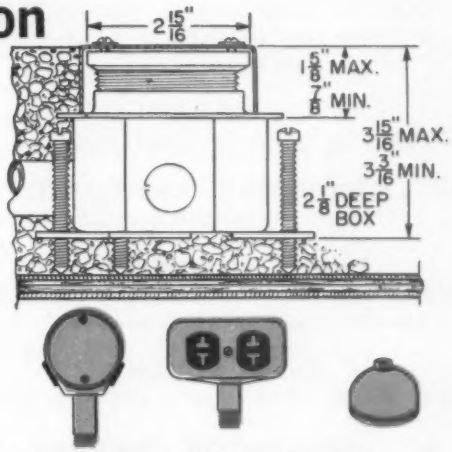

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With Completely Concealed Pivot Pins

Lightweight . . . Strong . . . Durable

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Slick silicone surface finish-reduces friction for easy pulling.

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Other features of Paranite Parasyn Type TW 600 V. building wire include a thermoplastic insulation that provides high dielectric, mechanical strength, longer life and is flame, moisture, and oil resistant.

U. L. listed in sizes AWG 14 through 2000 MCM. Standard colors available from stock in both solid and stranded, sizes AWG 14 through 1000 MCM.

Each Carton packaged to reduce handling and labor cost with "color-coded" labels plainly showing type, size and color of wire. Also, new reel cards for instant identification and inventory control.

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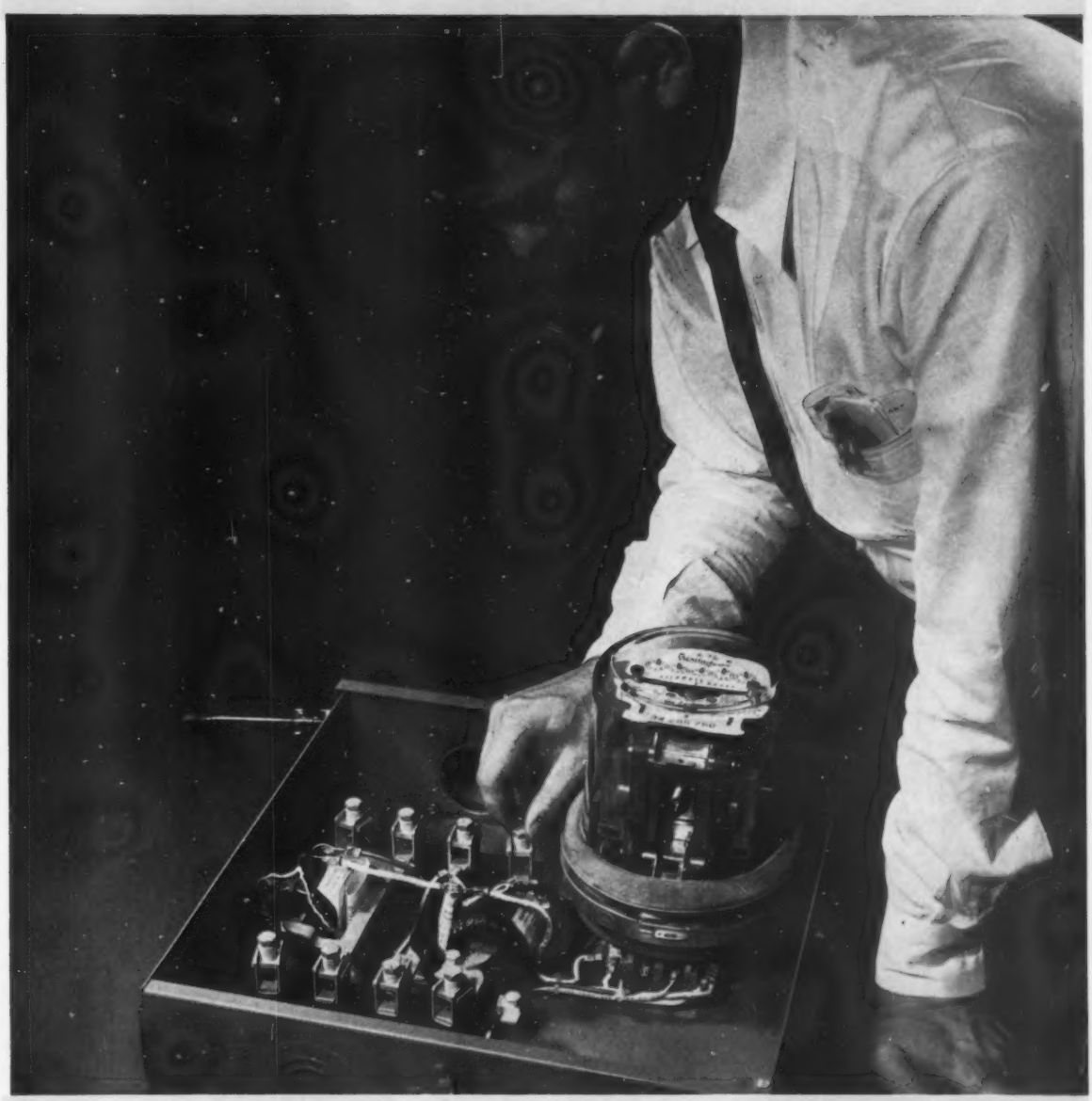

Modern trends in metering section discusses high capacity meters, load demand surveys, ultrasonic cleaning, and "package" units.

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Modern trends in meter practices

By Thomas D. Barnes

Manager Meter Engineering
Westinghouse Meter Plant
Raleigh, N. C.

◆ "NOTHING is so constant as change." This axiom applies to the design and application of the conservative watthour meter as well as it does to other products and lines. It is interesting, therefore, to contemplate the probable changes that will take place. Crystal gazing, anticipating the stock market, and predicting the future are always interesting pastimes. Trends, however, are not so much speculation as they are the extensions of past experience based on probability and the many known factors of experience.

In the metering field several significant trends are observable—most of them keyed to the vast increase in electrical energy as the American standard of living rises.

Increase in meter obsolescence

At the present time the electric utility industry is investing more than $70,000,000 annually in metering equipment. This represents much more than the meters needed to serve new customers. In the year 1949, for example, new single-phase meters were distributed as follows: 30% for new residences, 34% for new customers in other than new residences and the balance of 36% for retirement of obsolete meters.

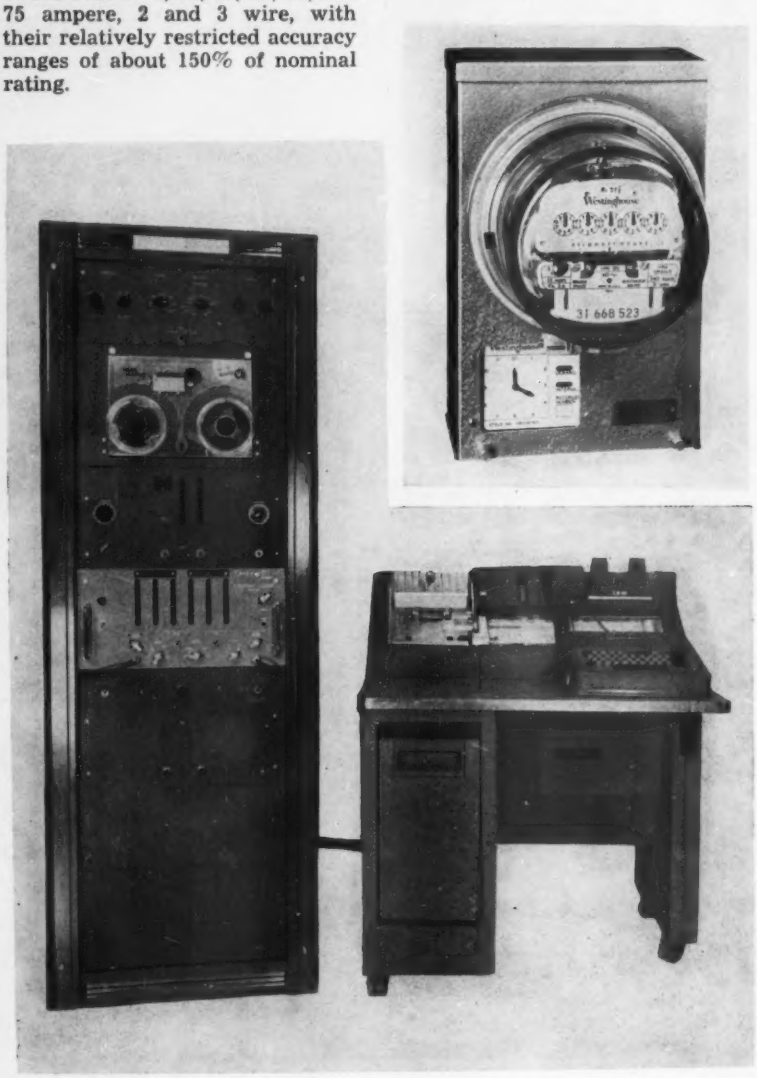
Indications for ten years later, or 1959, are that new single-phase meters are now distributed approximately: 35% for new residences, 20% for new customers in other than new residences, and 45% for retirement of obsolete meters.

A word about obsolescence. Meters don't normally wear out - they simply "fade away!" - due to replacement because of inadequacy of operating performance of capacity rather than because of wear or deterioration from use.

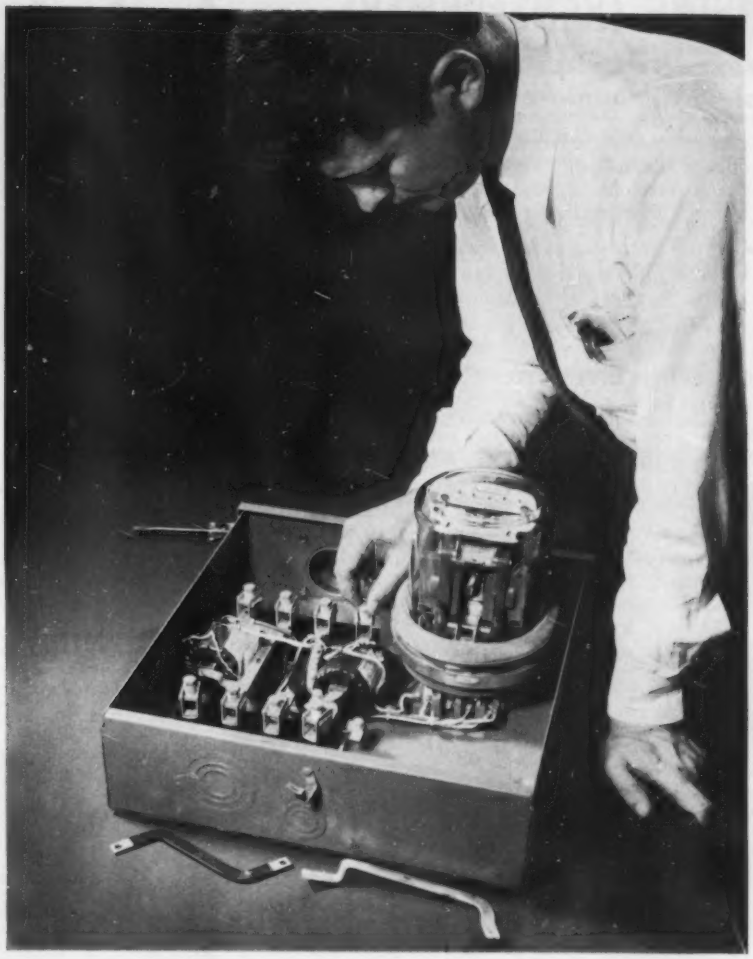
Simplification of ratings

Loads requiring direct-connected or self-contained watthour meters run up to approximately 200 amperes, beyond which general practice indicates the use of instrument transformers. In the earlier days, because of restricted accuracy ranges of meters, it was necessary to have a wide variety of ratings, as exemplified by those of the 1920's—5, 10, 15, 25, 50, and 75 ampere, 2 and 3 wire, with their relatively restricted accuracy ranges of about 150% of nominal rating.

Extensions of overload accuracy to approximately 400% rated load in the late 30's permitted a reduction in the number of ratings to 5, 15, and 50 amperes. Recent developments now yield meters with an accuracy range of around 700%



Rapidly increasing loads have added greatly to the importance of load surveys. An interesting recent development in this field is the low-cost magnetic tape demand recorder, shown above, and the central office transcribing equipment shown below which transfers load survey data to punched cards or paper tape—making survey data quickly available for study by distribution system engineers.



Another important step towards more versatile metering is a universal unit now available for Class 200 applications which consists of an integrated combination of watthour meter and current transformers. It combines a basic two-stator Class 10 watthour meter with through-type transformers in a single enclosure. Interchangeable bus bars permit its application to a wide variety of circuits.

rated load. Therefore, only two self-contained current ratings are now required, 15 and 30, with a strong indication that the latter may well become the "universal" single-phase meter for residential use.

The reduction to basically three ratings, (including the Class 10 transformer type) has been made possible by three things: (1) Technological advance in meter design. (2) Increased use of electricity in homes. (3) Improvements in manufacturing techniques which have eliminated price differentials between ratings.

This at once puts in the hands of utility companies the means to avoid in the future the problem they have heretofore been facing of changing out meters of lower ratings to accommodate the ever-increasing loads.

Another facet of simplification of meters is that of the terminology of ratings. Until recently, meters had been rated at the "full load calibration" or rated load point, such as 5 ampere, 15 ampere, etc. The primary reason for this nominal rating, was the need for identifying the test constant to the test speed at the test current to provide correct calibration.

However such ratings had very little meaning relative to their maximum working capacity, which over the years has been progressively increased from 200% rated load in the 1920's, 300% in the early 1930's, and 400% in the late 1940's, to 667% since early in the 1950's. A rating of 15 amperes seemed rather illogical for a meter which had an acceptable accuracy range of up to 100 amperes!

Consequently, the AEIC-EEI-NEMA Committees have worked out a class designation for watthour meters which denotes the maximum of the load range in amperes. For purposes of identifying the test constant, a test ampere (TA) value is marked on the name plate and indicates the current basis on which the meter is to be calibrated.

Thus the new meters are identified as Class 10 (2-½ test amperes) transformer type meter, Class 100 (15 test amperes), or Class 200 (30 or 50 test amperes) self-contained meters. Meter working capacities are, therefore, immediately indicated by their new ratings.

Reduction in meter testing

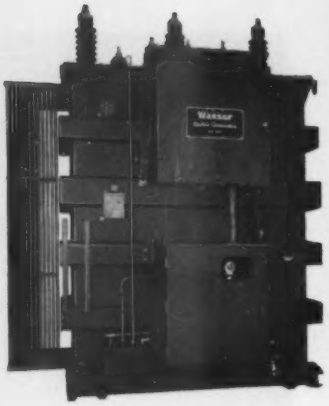
Utility meter departments are responsible to their own management (and to the Public Utility Commissions where applicable) for the accuracy levels of all watthour meters on their systems. In the past this has meant that every meter purchased was rechecked for calibration accuracy, and in many cases, for other characteristics such as insulation level, bearing cleanliness, register mesh, etc.

The economic pressures on utilities in recent years, however, has started a trend where more and more meter departments are reducing or eliminating acceptance tests. This, of course, puts the responsibility up to the meter manufacturer to supply watthour meters within the required limits. Progress is being made to the point where the accuracy and quality is now probably higher than that of any other measuring device used to purchase commodities today and, in many cases, more accurate than the reference test facilities.

A further step towards the reduction of utility costs is the trend towards longer test periods for meters in service presently defined by practice and the Public Utility Commission at eight years for the residential single-phase meters. The modern watthour meter has proved to be so stable in operation over extended periods, without appreciable deterioration in any characteristic such as bearing wear, demagnetization, and failures due to lightning and corrosion, as to justify this considera-

WAGNER LOAD TAP CHANGING TRANSFORMERS

offer new simplicity of design . . . new quietness of operation . . . new freedom from maintenance



Here is a compact, extremely simple power transformer load tap changing mechanism, using a single drive shaft and one set of miter gears to assure quiet operation. Magnetic amplifier control means higher accuracy in the voltage sensing circuit, and greater reliability since no moving parts are necessary.

The design simplicity of the Wagner load tap changer . . . in the drive mechanism, the transmission assembly, the switches and the control circuit . . . results in long, efficient operating life with freedom from maintenance.

For full information on these Load Tap Changing Power Transformers, consult your nearby Wagner Sales Engineer. There are Wagner branches in 32 principal cities.

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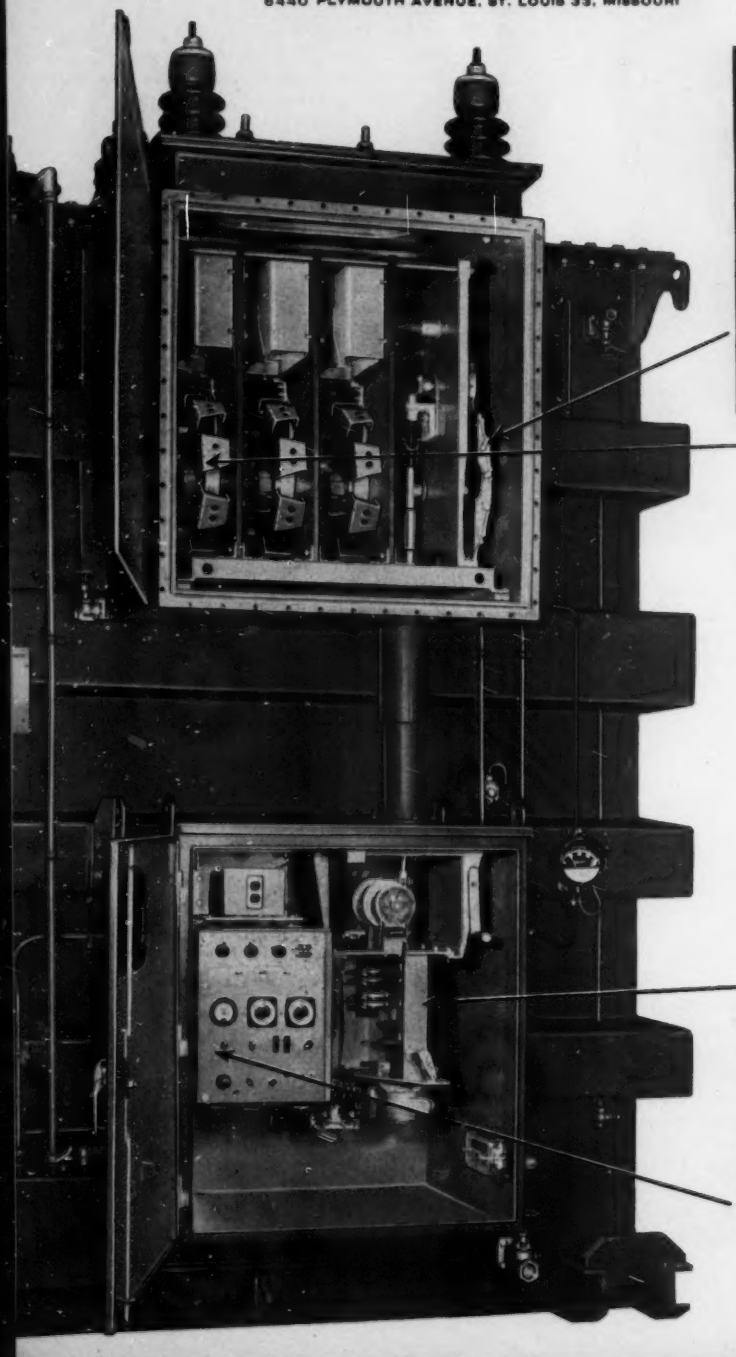


ONLY 2 GENEVA GEARS

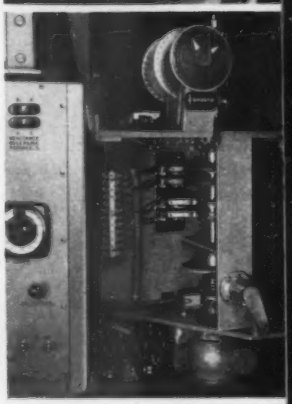
The two Geneva gears operate from a single drive pinion, and are designed for 90° entrance to reduce noise of operation. The reversing switch operates from a cam in the face of the tap selector gear which has a positive mechanical stop to prevent overtravel.

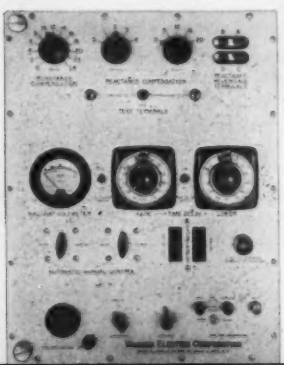
MAXIMUM LIFE CONTACTS

All switch contacts, both moving and stationary, are alloyed copper for maximum resistance to wear . . . reliability proved by life tests far exceeding normal operating conditions. Moving contacts self-aligning . . . free parallelogram action assures maximum contact area with constant pressure.

SINGLE SHAFT DRIVE

A single main drive shaft, geared to the drive motor and to the drive pinion, operates the tap selector switch and the load transfer switch. This shaft also operates the position locating switches and the position indicator.





MAGNETIC AMPLIFIER CONTROL Magnetic amplifier control eliminates moving contacts in the voltage sensing circuit . . . provides simplified and highly accurate band width control.

WT59-14

tion of longer test periods.

This trend is currently taking the form of random sample testing. As reported to the EEI-AEIC Meter and Service Committee meeting April 27-29, 1959, in St. Louis, of 53 companies represented, 15 indicated that they were using some form of random sample testing and 34 that they plan to do so when they have local commission approval. Experience and data analysis indicates that meters in error can be found as effectively and at less cost by random sample testing as by periodic tests.

Higher secondary voltages

It is now estimated that the present average residential consumption of 3,366 kilowatthours annually will increase by 1970 to 7000 kilowatthours.

This is not difficult to accept in view of the present rate of over 1,000,000 new homes annually. A majority of these are supplied with 100 ampere entrances as a minimum with a rapid increase in the use of 200 ampere services. The peak demand of 40 to 50 kw for the so-called all-electric home will be relatively commonplace.

Distribution engineers are aware that it is economically impractical to obtain satisfactory voltage regulation on conventional 120/240 volt secondaries with such heavy loads. Consequently, the trend in planning is towards higher secondary voltage.

Whether the trend will be toward single-phase or polyphase depends upon studies now being conducted by various utility organizations and a recently established joint EEI-NEMA Committee. Early studies favored polyphase distribution, but the present trend to such circuits is not nearly as extensive as predicted earlier. There are several reasons for this. Three-phase, 4-wire services are considerably more expensive than those for single-phase. Also single-phase motors yield favorable higher power factors because of their capacitors and are not as subject to unbalanced voltages as are three-phase motors.

Other factors also complicate the distribution and metering of higher voltage circuits. The National Electrical Code presently limits the voltage of residential branch circuits to not over 150 volts to ground. The use of plug fuses is also restricted to such voltage levels.

Which voltage system should be used is now a subject being debated by the EEI Transmission and Distribution Committee and others. Circuits of 240/480 single-phase, 240/416 wye three-phase, or 265/460 wye three-phase are those being most seriously considered at the present time.

Wider use of load surveys

Because of the concern being felt by utility managements for the fast increase in the use of electrical energy, it is becoming recognized that load surveys are necessary aids, not only in forecasting loads for system planning, but in economic studies to suggest sales promotion policies to improve system load curves, and in rate studies to gather data for classifying loads equitably.

It must also be realized that a detailed study of the elements of the system load curve must be a continuing process in order to determine accurately the effect of new appliances and the new living habits which they tend to promote. Taken together these factors can exert a profound effect on the profitable operation of a utility's distribution system. As examples, one needs only to cite the summer air conditioning load and the electric clothes dryer to show how new appliances in significant numbers can change the system load curve.

For some time a number of electric utilities and members of the EEI Rate Research and AEIC Load Research Committees have been stressing the need for a simplified and lower cost means of making load surveys. Their concern over this problem is easily understood when a look at reliable forecasts shows that the average residential kwh consumption is expected to double within the next decade. The growth of electric heating, air conditioning, and other appliance loads have changed system load curves completely within the past several years. It is, therefore, increasingly important that utilities obtain accurate data on the load characteristics of the modern electric home if future rates are to be soundly based.

One attempt to meet the requirements for such studies is the load survey system brought out recently by one of the meter manufacturers. It features (1) a dependable and low cost recorder easily installed on a customer's service, (2) a means of transferring data from the recorder directly to IBM punched cards or paper tape without the costly labor and possible errors of manual chart readings and (3) re-usable recorder tapes. The chief advantage to users is the rapid availability of the survey data in usable form for machine processing. The equipment is shown in accompanying illustrations.

More versatile metering

In the interest of further economy to the electric utility companies there is a definite trend towards simplification of watthour meters and installations. One example is the great increase in the use of through-type current transformers for secondary metering.

Another example is the decreasing use of three-stator meters on both delta and wye four-wire systems in favor of the lower cost equivalent two-stator meters.

Blondel's Theorem states in effect that "a circuit may be accurately metered under all conditions of load, with one less number of meter elements than there are conductors in the circuit." True accuracy under all conditions on a 3 phase, 4-wire circuit therefore requires a 3-stator meter. However, many investigations and studies have shown that in practice, net errors of 2-stator meters are negligible in most cases and do not justify the approximately 40% greater cost of the 3-stator meter.

This seems entirely reasonable when it is realized that the compromise of possible voltage unbalance is no different from that existing in the widely used single-phase 3-wire meter. In fact, the over-all possible error is even a smaller percentage inasmuch as voltage errors can affect only one of the three metered circuits, the other two circuits being accurately metered in all cases. Good voltage regulation of modern systems still further reduces the possible errors.

Another important step towards more versatile metering is a universal unit, now available for Class 200 load applications, which consists of an integrated combination of watthour meter and current transformers. Recently announced to the trade, and shown in one of the accompanying illustrations, this development combines a basic two-stator Class 10 watthour meter with through-type current transformers in a single enclosure. Interchangeable bus bars can be arranged to meter three-wire circuits, either single-phase, three-phase, or network; or four-wire delta or wye circuits. These

(Continued on page 88)

How ultrasonic cleaning can

By Paul M. Platzman
Executive Vice-President
Narda Ultrasonics Corp.
Westbury, L. I., N. Y.

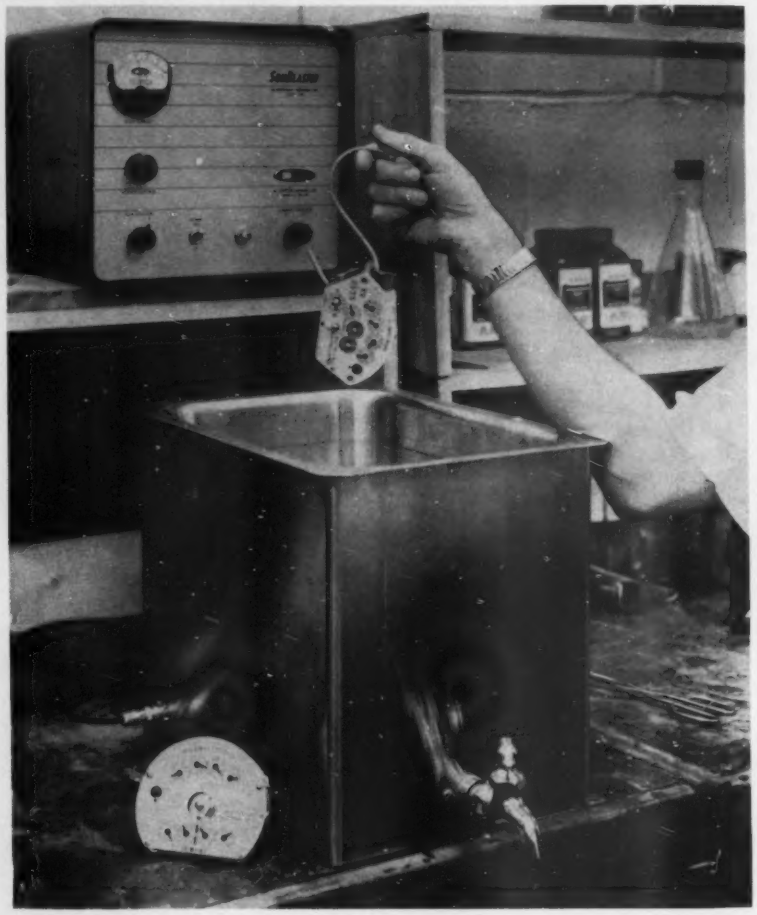
◆ ULTRASONIC CLEANING, a new industrial process of the Space Age, is now cutting the cost of maintenance of demand meter and regular meter registers and timing devices by cleaning parts faster and with infinitely greater precision. Furthermore, ultrasonically cleaned and reconditioned equipment is more reliable, contributing to greater recording accuracy. In many cases, ultrasonic cleaning enables recovery for use of combination registers which have been entirely carbonized from internal explosion and discarded as junk. The reuse of old salvaged registers enables deferment of capital expenditures.

Proper maintenance and service requires periodic and thorough removal of grease, oil, dust, soot, carbon, sand, and many other contaminants from these devices. To clean these registers in the conventional way involves the tedious and expensive work of complete disassembly, cleaning the individual parts, and finally the job of reassembly, all done by skilled mechanics. With the ultrasonic cleaning method there is no need to tear down the mechanism to clean it nor does it require special skills or training. The complete assembly is submerged in the ultrasonic cleaning tank and cleaned as is. Shafts, gears, bearings, and all other parts are thoroughly cleaned with no physical labor or mechanical brushing.

When you consider the millions of meters that must be cleaned in the course of the year and add up the man hours required to take the meters apart, clean the pieces and then reassemble the units, you can readily see that doing the work in the old-fashioned way runs up a walloping bill for labor, varying from $2.50 to as high as $9 or $10 per register, depending on the method used. By contrast, ultrasonic equipment results in a really worthwhile saving. One company reports that it is cleaning at a cost of slightly more than $1.00 per register.

For example, one utility company using a 300-watt generator and two 5-gallon capacity transduceriz-ed tanks, cleaned 16 registers in 36 minutes. Preparing the registers for ultrasonic cleaning took 22 minutes, so that the actual ultrasonic cleaning time was only 14 minutes, or less than one minute per register!

(Editor's note: ultrasonic cleaning is also being used successfully to clean glass meter covers. One southeastern utility company's ex-



A wide range of ultrasonic equipment is available to meter engineers to help them solve their meter maintenance problems. Some typical equipment is illustrated here. Directly above is one of the simplest arrangements: an ultrasonic generator connected to a transducer in a tank equipped with a draining spout. At right, above, is a recently developed fully automatic, push-button ultrasonic vapor degreaser, especially well suited for automatic cleaning in the meter industry. This device includes heating coils, solenoid-operated valves, recirculating pumps, remote control panel, etc. At right, below, is a versatile small model featuring a transducer tank fitted with two chemical beakers. This permits two types of cleaning fluids to be in use at the same time and is suitable for a wide range of laboratory and shop cleaning problems.

lower meter maintenance cost

perience in this field will be described in a forthcoming issue of ELECTRICAL SOUTH.)

Ultrasonics had it beginning about 75 years ago. Somebody blew a special whistle. Nobody could hear it but all the dogs in the neighborhood came running. This was the first practical application of ultrasonics - sound waves whose frequency is too high for humans to hear. It took another fifty years or so before inventors began to develop the full potentialities of these vibrations.

Today ultrasound does many jobs - and research by the many companies that make ultrasonic equipment promises to find additional jobs for it - faster, better, or cheaper than they can be done any other way. It is most widely used in cleaning everything from false teeth and contact lenses to missiles, metal finishing and electroplating, for non-destructive testing, and thickness gaging.

It is also used for welding, soldering without flux, mixing of chemicals and acceleration of chemical reactions, drilling, underwater communications, sonar sensing of liquid level and measurement of liquid flow and volume, burglar detection devices, smog and industrial smoke control. It is being used to an ever greater extent in industrial drying applications, fog dispersal, cooking, meat preservation, and hundreds of other important things. Ultrasonics is a technological break-through.

Typical ultrasonic systems

A typical ultrasonic system consists of a generator that produces pulsating electrical power of a suitable frequency; and a transducer or transducers.

Generators may be electronic or motor-driven. Electronic generators which are more commonly used, vary with different units and purposes. Power supply ranges from 110 to 440 volts at 60 c.p.s.; frequency from about 18 kilocycles a second to 1 megacycle; output from 20 to 10,000 watts. The power requirements are related to the size of the ultrasonic tank which can range from quart size to capacities in the thousands of gallons. Electronic generators are relatively trouble-free, having few moving parts, and only requiring occasional replacement of tubes.

Uitrasonic frequencies above the human audibility level are created by rapidly vibrating bodies, much as audible sound (encompassing the range of 50 cycles per second at the low or bass end to a high of about 15,000 cycles per second on the high or treble range) is created by a tuning fork. Ultrasonic vibrations usually are supplied by transducers that convert electrical power into mechanical motion.

Ultrasonic transducers are of two types: magnetostrictive, in which a rod of metal—usually a nickel or steel alloy — changes its dimensions and vibrates in response to a varying magnetic field; and electrostrictive, or piezoelectric, in which the element—a ceramic such as barium titanate, or a crystal such as quartz or mica—changes its shape and vibrates in response to a varying voltage. Excited by the high frequency current, the transducers expand and contract, resulting in mechanical vibrations silent to our ears, but capable of doing fantastic work.

For meter and cover cleaning, electronic generators and barium titanate transducers are the most ideally suited and comprise 95% of all industrial installations of ultrasonic equipment.

Ultrasonic cleaning action

What ultrasonics does is bring a new form of agitation to the cleaning process. Working at great speed and force, the sound waves create a swirling sea of submicroscopic bubbles, rapidly forming and collapsing. This cavitation which is often referred to as cold boiling, beats against the surface of the parts being processed with pressures as high as 1000 atmospheres, yet does not damage surfaces.

In addition to this vigorous "carpet-beating" effect, the ultrasonic vibrations speed the chemical action of solutions that attack the dirt chemically, and the dissolving, wetting out or dispersing action of solvents and detergents. What happens is that the sound waves alternately compress and decompress the solution in the ultrasonic tank, and the molecular agitation set up by the shock waves gets under foreign material—grease, oil, shop soils, organic matter, oxides, etc. In a matter of seconds (or minutes in most cases) all traces of contaminants are removed, leaving the original surface unmarred and cleaner than by any other method. Not only is it a matter of speed and precision, but ultrasonic action can penetrate blind holes, crevices and areas where mechanical methods are stopped.

Formation of cavitation bubbles depends, among other things, on the vapor pressure of the liquid. Vapor pressure depends on temperature. So it is usual to raise the operating temperature of the liquid. Temperatures for optimum vapor pressures vary with the fluid used. If water is the fluid, operating temperature is about 140°F; if solvents are used, 120°F is best.

Ultrasonic vibrations penetrate most solids. So if smaller containers holding liquid are immersed in the liquid of a larger container that is subjected to ultrasonics, vibrations will penetrate and cavitate the liquid in both the larger and smaller tanks, without appreciable loss of energy. This makes it possible to use one ultrasonic unit to simultaneously energize several glass, metal or plastic containers holding different types of cleaning or rinsing agents. For handling parts in baskets or trays, it has been found best to use solid bottom containers with perforations at the side for entrapped air and released contaminants to escape, or wire screen with openings of at least ½ inch. With openings below that size, especially in screens with openings smaller than ⅛ inch, efficiency drops drastically, except at very high frequencies since the openings filter sound much like a window screen filters light rays.

The sound waves set up by the transducers flow perpendicular to the face of the transducer. So, units mounted on the bottom of a tank create cavitation straight upward, while those on the sides create it in a horizontal path. Parts to be cleaned should be placed directly in the path of the cavitation.

The lower frequencies in the order of 20 kilocycles per second to 100 kilocycles per second convert more of the power input to cavitation energy and are more efficient. However, the higher frequencies (500 kcs to 1 megacycle) produce a narrower beam and are more effective where deep, blind, narrow recesses must be cleaned. But propagating ultrasound in a very narrow beam is not economical.

Cleaners now on the market

Prices vary greatly. One small cleaning system is available for less than $200; on the other hand, large cleaning systems for cleaning entire rocket engines may cost many thousands of dollars. Whatever the price tag, the proper equipment can save more than its cost in the first year and in some cases, in the first day.

A typical ultrasonic cleaning machine consists of a generator and transducerized tank, and the larger the capacity of the tank, the larger and more powerful the generator required. The choice of size of tank required depends upon the dimensions of the part to be cleaned and the number of parts per hour production desired. There are more complex cleaning systems incorporating recirculating systems, filters and heaters, temperature controls, solution level controls and other features. There is an ultrasonic cleaner available to meet any budget.

For cleaning all types of precision components, including meters, there is now available a fully automatic, push-button ultrasonic vapor degreasers, specially designed for this work.

Automatic cleaning in the vapor degreaser is merely a matter of immersing the dirty timing device for only a few minutes in an ultrasonically agitated solvent to blast off all the soils. The movements are then flushed at high pressure with filtered and distilled clean solvent sprayed by a built-in spray lance. The parts are then subjected to hot solvent vapors for ultimate cleanliness. The movements remain in the vapor for about 30 seconds allowing condensation of the pure distilled solvent and drip-off of lost residues of grease and oil.

Heating coils in the solvent boiling sump of this machine generate a continuous supply of solvent vapors. The vapor is automatically condensed, distilled, and recirculated as pure liquid to the base of the vapor tank, thereby conserving the solvent and lowering the cost of operation.

All valves are solenoid-operated and remotely controlled from a push-button panel on the front of the machine. The degreasing machine and plumbing are of stainless steel for long life and avoidance of recontamination.

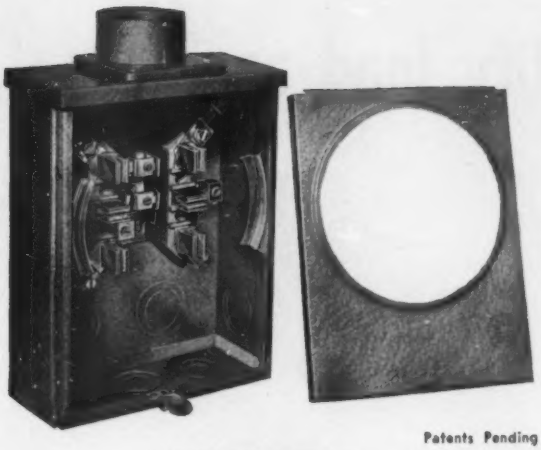
With one man feeding three or four meters simultaneously into the machine, a daily output of 500 meters is estimated per eight-hour day.

Solvents and cleaning chemicals

Manufacturers of the meters as well as the utilities have found that ultrasonic cleaning works thoroughly, reliably, and with a minimum investment in time and material, not only on individual parts but on complete, complex assemblies and sub-assemblies.

The typical dirts and contaminants that ultrasonic cleaning removes are: radioactive particles; buffing, lapping, and honing compounds, polishing rouge and tripoli; die lubricants and parting compounds; plaster of paris; flaw-detection compounds; dust, sand;

(Continued on page 137)



Patents Pending

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SIZE 10½" x 8" x 3⅝"
175 Ampere Capacity
3-Gang Ground, 5th and 6th Terminals
Added Line Terminals for connection to other sockets

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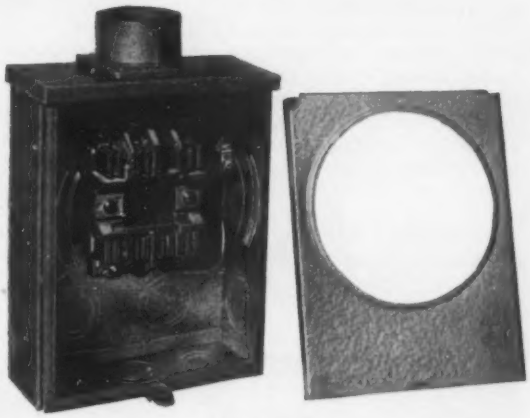

Patents Pending

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No Sealing Ring required! New Snap Latch sealing device. Interchangeable conduit hubs, and many additional flexible features. Stainless steel sealing latch and stainless rivets eliminates electrolytic deposits. Unique hinge terminals, pressure plate design, 4/0 capacity—straight-thru single or 3 gang terminals—5th and 6th terminals—semi-automatic visible by-pass—and many other features. . . .

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Austin Electric Dept.
Austin, Texas

◆ RAPIDLY growing loads have placed added emphasis on the need for accurate load survey information. Here in the electric meter shop of the City of Austin, Texas, we have made good use of two specially designed metering devices assembled from regularly available components. One of these was developed particularly for analyzing distribution transformer loads; the other has been useful as a substation circuit analyzer, although it can be used also for gathering data on customer loads.

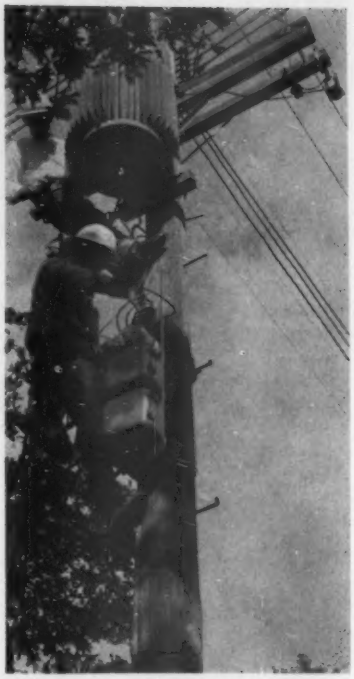
The distribution transformer load analyzer consists of four round socket meter bases joined together with short pieces of conduit. In the first meter base we placed a window type current transformer (with metering accuracy), on which we wound a primary of No. 8 wire. In this winding, we brought out taps representing ratios of 2 to 1, 4 to 1, and 8 to 1 in order to use the analyzer on different size transformers. These taps are brought out to a terminal strip and arranged so the load leads from the transformer under test can be placed at the desired tap setting. The test leads are connected into the neutral side of the primary feed of the transformer. A standard size, glass watthour meter cover is placed on the socket base in the regular manner, covering the current transformer, so that the terminal strip and markings are plainly visible.

The second socket meter base below the current transformer is for the watthour meter. This meter gets its potential (220 volts single-phase) from the secondary of the distribution transformer under test.

The third socket meter base is for the kw graphic meter. This meter also gets its potential from the secondary of the transformer under test.

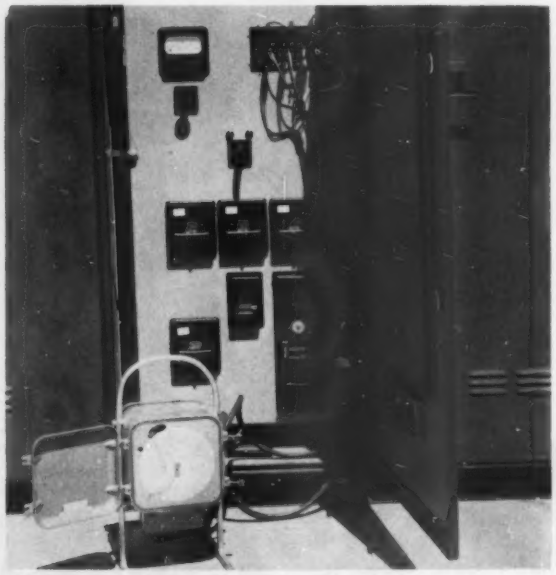
The fourth socket base is for the reactive kva graphic meter, and is

(Continued on page 140)



The distribution load analyzer is shown here being put in place on pole just below transformer.

Alfred O. Tramp, superintendent, Austin Electric Meter Dept., displays the distribution transformer load analyzer developed by his department.



This metering device, featuring kw and reactive kva graphic meters mounted back-to-back, has been useful in analyzing substation circuits and large loads.

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A-1160-E

Trend toward high capacity metering

By O. K. Coleman

Vice-President
Duncan Electric Co.
Lafayette, Ind.

◆ THE FAMILIAR growth pattern of the electric utility industry, doubling its output about every seven years, has created metering problems as the average annual consumption in homes and farms increased from a national average of about 500 kwh to some 3,366 kwh at the close of 1958.

The load growth pattern resulted in a trend toward high capacity metering, and there is an interesting story in the way the electric meter industry has kept abreast of that trend.

In the early days of the industry, the great majority of the installations were served with 5-ampere meters, and these early 5-ampere meters were good for just about that amount of current. By the '20's there was in use quite a variety of meter ratings, including self-contained meters up to 150 and 200 amperes. These were, however, bulky affairs, and by the time the socket type meters were introduced in the '30's, maximum self-contained meters had a maximum capacity of about 100 amperes.

An analysis made in the middle '40's showed that of all the installations greater than 100 amperes, about 90% of them were less than 200 amperes. Consequently, here was a considerable number of installations that might be covered with one high capacity meter if it could be worked out economically. The problem was tackled, and it was found that most of the then high capacity socket type meters were actually good for some load considerably above 100 amperes. Most of them, when they were connected directly to conductors of suitable size (4/0 copper to get 200 ampere capacity), would run up from 150 to near 200 amperes without exceeding the accepted temperature rise of 55°.

The main problem then was to provide a device that would permit the use of these meters on high capacity services. In 1949, a heavy duty mounting device, capable of connecting the meter terminals to conductors up to 200 ampere capacity (4/0 copper or 250 mcm aluminum) was introduced.

Although such a combination would work satisfactorily on most 200 ampere services, if the load should continue at 200 amperes for long periods the standard 50 ampere meter would come close to or possibly exceed the acceptable 55° rise, therefore, the Duncan Company made a modification of their MFS meter, putting additional copper in the current coil and thereby reducing the temperature rise to something considerably under 50° with a continuous load of 200 amperes.

What is now called the Class 200 Type MK meter, with test ampere ratings of 50 or 30 amperes also has a continuous carrying capacity of 200 amperes—well within the generally acceptable limits. This is also now true of all American meter manufacturers' Class 200 meters, and the Class 200 meter is used as the general purpose meter in many areas.

Increased flexibility

Services generally are divided into 100 amperes as a minimum, with many installations running to 150 and 200 amperes. Since the modern Class 200 meter is suitable for all loads up to 200 amperes, it is quite proper to use it in 100 ampere capacity devices which in turn may be used even on lower capacities (60 amperes considered minimum generally).

With the introduction of the high capacity single-phase, the question in everybody's mind was—why not a similar high capacity polyphase? Since there was a demand, naturally the meter manufacturers proceeded to provide the needed equipment and one of the first high capacity, 7-terminal meter mounting devices, with 200 amperes capacity, known as the HD-7, was introduced in 1951.

The single-phase device being available, the mounting device for 7-terminal polyphase meters with 200 ampere capacity was simply a matter of mechanical design. The polyphase meter to go with it, however, was another matter. The self-contained 2-element polyphase meter which has only four current terminals and one potential was no particular problem and was made for use in the HD-5 devices, a 5th terminal being provided for use with the 2-element meter. The current circuits in these devices are no particular problem since the two current circuits are similar to the single-phase.

The 4-wire meters, however, some of which have four current coils (the so-called 2½ element or split coil meters) must be provided with considerably more cross-section of copper than needed for the single-phase or 2-element polyphase. Since each of the current coils contribute some heat, with twice the current coils it is going to take approximately twice the cross section of copper for each coil compared to a 2-element 3-wire 2-current coil meter. The arithmetic then is simple, but getting such coils into existing meters naturally represented a problem.

Most of that, however, today has been accomplished and polyphase meters, starting with Duncan's MH line in 1951 are now available with capacities up to 200 amperes. All of the present Duncan polyphase meters are available in the so-called Class 200 with test ampere ratings of 30 or 50, and suitable for use up to 200 amperes where connected with a mounting device having corresponding capacity such as the HD-7.

Extended to poly phase

For clarification here we should point out that due to the trend toward the TA-30 ratings with Class 200 single-phase meters, there has been some demand for similarly rated polyphase meters; consequently, Duncan is now in process of switching from MH to ML (the "L" indicating long range). Actually, the Class 200 ML meter is almost identical to the MH except for the nominal rating. Where the MH was rated 50 amperes with a a basic K_h of .6, the ML will be rated Class 200, TA-30 with a basic K_h of 1.2.

Note that actually this meter so rated runs near the same speed as

ALLIS-CHALMERS modern line for '59

Small size saves panel space.

A-C Introduces New Static Relay

COLLEGE STATION, Texas, April 13 — Over 300 relay engineers and scientists witnessed another example of the Electronic Age today when Allis-Chalmers introduced a new static protective relay. The new development was disclosed in an engineering paper presented by John Baude, Allis-Chalmers engineer, before the Twelfth Annual Conference for Protective Relay Engineers.

The new relay, designed for industrial switchgear application, is the first major departure from conventional relay construction in 50 years.

NO MOVING PARTS

Of particular significance is the elimination of all moving parts through the use of semi-conductors such as transistors, diodes, thermistors, and varistors. Use of these components combined

FIRST

completely static protective relay!

. . . available in Allis-Chalmers switchgear

This highly reliable *new* protective overcurrent relay has no moving parts . . . it's static, and it's only ⅓ the size of conventional relays.

Employing transistors, printed circuits, and other electronic components encased in epoxy-resin, A-C static relays are shock and moisture resistant They're unaffected by temperature changes, operate with low burden, and have instantaneous reset feature. Quick plug-in construction makes replacement easy.

Want more protective relay-equipped switchgear facts? Contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-1157-E

ALLIS-CHALMERS

the new 30 ampere meter, being just a little slower than the old 50 ampere at any given current. The main reason for making this switch in the rating of the polyphase meter was to provide a good Class 100 polyphase meter. The lower basic speed of the ML meter lent itself to a simpler design Class 100 meter, so our present line of polyphase meters will have Type ML in both Class 200 and 100. The meters are similar except each has the capacity denoted by its class rating.

The MD (Medium Duty) device was introduced in 1954.

As most of us know, there are thousands of 200 ampere services where even the occasional maximum demands are less than 200 amperes and for the most part run below 150 amperes. While an HD device will do the job on such services, there could be some economy if a lighter and lower cost device could be made to handle the maximum demands, particularly over the short times. That is exactly what the MD device was designed for.

Bypass development

The high capacity sockets (such as the HD in 1949) for the first time furnished a practical method of by-passing the load when it was desired to change meters or to momentarily pull a meter for the insertion of testing facilities. Such facilities are generally found more necessary on polyphase services than on single-phase services so the MD devices with their by-passing facilities are frequently used on even 60-ampere polyphase services (and some low capacity single-phase too if there is a circumstance making it necessary or desirable to by-pass).

By-pass devices offer a feature that is almost essential in some cases in field testing. The conventional test jack provided with a by-pass (by interrupting the load) will usually not have sufficient capacity to handle loads over 100 amperes. The low capacity test jack, however, can be used and *without interrupting the load* where mounting devices provided with in-built or removable high capacity by-passes are used.

In 1955 the Type MK Class 200 meter was introduced to supersede the (1949) MF-SE. As far as high capacity metering is concerned, it did not affect the general applications. However, it will be pointed out that this modern meter running at relatively slow speed per ampere lends itself admirably to tailoring the long range load curves.

Additional attention was given to the MD device in 1957 to provide what might be called fringe benefits of high capacity metering. When the Medium Duty devices were introduced in 1954, they were rated at 150 amperes. By 1957 there was a demand for a similar device to use on 200 ampere residential services and to cover the full capacity for short time demands. The jaws of the MD device were provided with a reinforcement

(Continued on page 141)

Mobile substations for remote areas

◆ THREE COMPLETE liquid-filled unit substations—mounted on steel trailers for total mobility—have solved the problem of supplying portable power to remote areas of Esso Standard Oil Company's Baton Rouge, La., refinery.

The units, rated at 300 kva, three-phase, step down incoming power from 2,400 volts to a utilization level of 480Y volts. They are used to supply power to pump motors, field lighting, welding apparatus, and other electrical equipment where utilization voltages are not readily available.

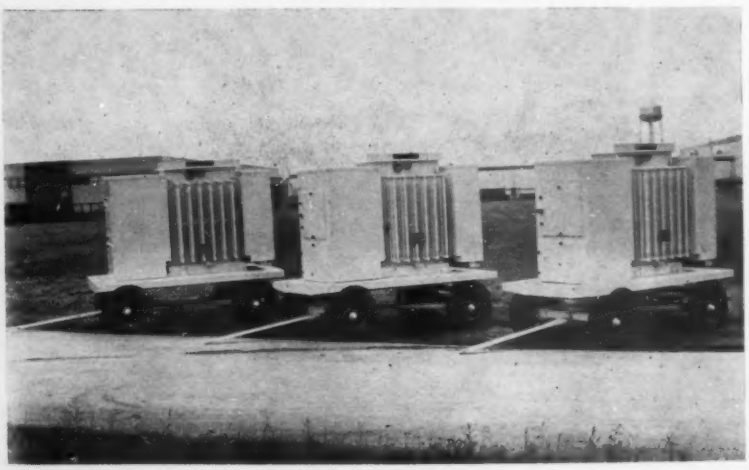
Designed specifically for this application, the transformers were built at General Electric's Medium Transformer Department, in Rome, Ga. There they were mounted on trailers equipped with standard farm wagon tongue-and-hitch hardware to facilitate mobility. A truck, tractor, or almost any vehicle can be used to move the units from job to job.

Each unit is 108 inches high and weighs only 8200 pounds. The incoming line compartments are equipped with a 100-foot reel of armored cable with three heavily insulated "snap-on" type clamps for connection to primary feeder lines.

Fuses in the high voltage compartments protect the transformer and connected equipment from short circuit surges or other high voltage impulses. Eight "arc-type" plug-in receptacles — designed to disrupt one phase at a time when disconnected—are supplied on the low voltage end of the unit for quick connection to utilization equipment.

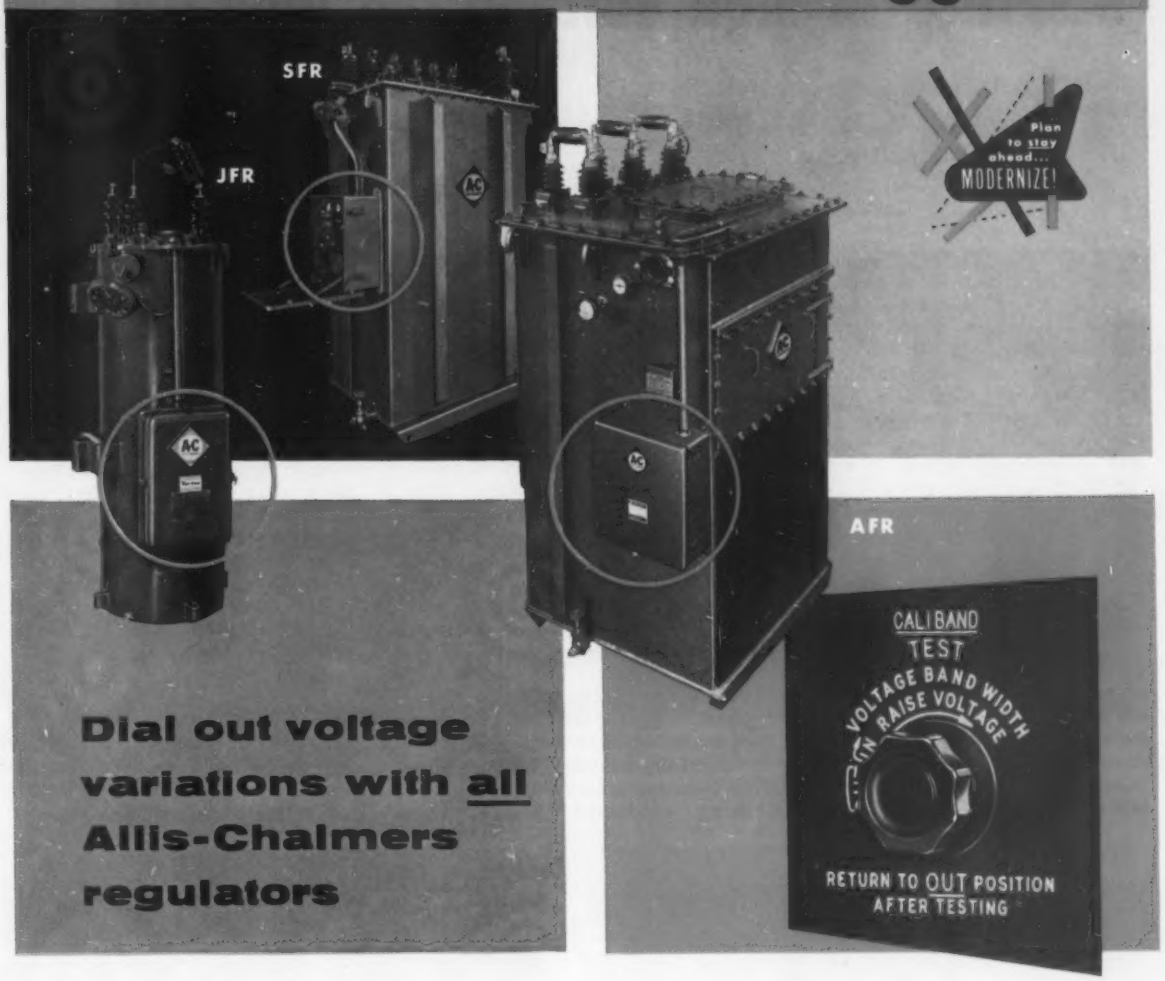
Each receptacle supplies an external load of up to 50 horsepower and all eight receptacles are controlled by one main feeder breaker. Low voltage clamp-type terminal connectors are supplied to by-pass the plug type outlets when it is desired to cable-connect directly to the transformer secondaries for full kva utilization.

Key interlocks on both high and low-voltage compartments offer the maximum protection against entry by unauthorized personnel or improper operation by inexperienced operators.



Three 300-kv integral distribution centers mounted on small steel trailers for complete mobility are designed to supply utilization voltages in remote areas of Esso Standard Oil Company's Baton Rouge Refinery.

ALLIS-CHALMERS modern line for '59



Dial out voltage variations with all Allis-Chalmers regulators

New Caliband regulator control gives you precise settings with a twist of the knob...ends customer complaints

Caliband is an Allis-Chalmers trademark.

Caliband control gives you complete freedom to test and accurately set voltage level and band width. There's no interruption of regulated service, no changing of customer voltage. Just a simple twist of the knob does the job.

CALIBAND control demonstrated

A call to your nearby A-C office will bring an engineer and a *Caliband* control demonstration kit to your desk. Or, write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS
Originators of 5/8% Step Regulators

A-1156-E

Safety in high voltage lab operations

By Alex Vitkus
Chief Electrical Test Engineer
Hubbard and Company
Chicago, Ill.

◆ POTENTIAL HAZARDS exist in every type of industrial operation. In addition to the more common industrial hazards an electrical research laboratory must guard against hazards which are truly of a "potential" nature.

For purposes of discussion, these hazards can be divided into three groups: (1) those which exist during the preparation stage of a test program, (2) those which exist while the test is in progress, and (3) those which exist upon the completion of the test program. There is some overlapping of hazards from one phase to another.

Case one is fairly easy to cope with. A basic rule which recognizes no excuses for violation restricts all test preparations to dead circuits. Interlocks and grounding devices assure that circuits cannot be energized while personnel are engaged in test preparations. Before any circuits are energized, the engineer in charge obtains clearance from the test coordinator who is responsible for knowing the whereabouts of all test personnel before permitting test circuits to be energized. Test circuits cannot be energized until the test coordinator completes a master interlock circuit.

Protection of personnel

With some exceptions, all tests are performed with personnel and observers removed from the immediate test area and sheltered behind protective enclosures. When it is necessary that some manual operation be performed on a particular specimen during a live test, the personnel involved are provided with protective clothing and such implements to provide the maximum possible degree of operating safety. Such tests are duplicated or simulated beforehand to assure that the possibility of malfunction is minimized.

Flashing warning lights are used to indicate areas where tests are being conducted. Should these warnings go unheeded, interlock circuits de-energize the test area when encroached upon.

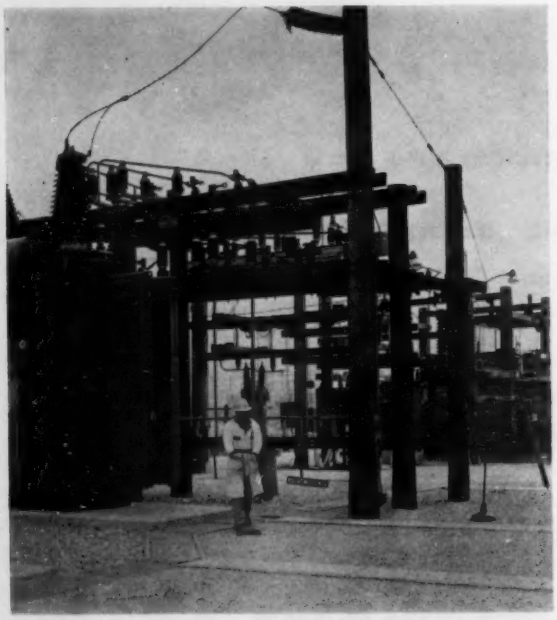
When a test or series of tests are completed personnel are restricted from returning to the test site until the engineer in charge gives the "all clear" signal.

Post-test hazards

Precautions must be observed after the completion of a test because hazards can exist even after the "all clear" signal has been given. Surge generators pose a particular problem in this respect. Even after these charging supplies have been de-energized the capacitors of a surge generator can retain a lethal charge for many hours. Improper grounding will not completely discharge capacitors thereby making them a trap for the unwary.

Apathy can be the greatest danger of all because all the interlocks and safety devices in existance will be useless if an individual deliberately seeks to circumvent them. The feeling of apathy

(Continued on page 140)



Danger area is fenced off before tests are begun.

Barricade and concrete test cell for technicians.

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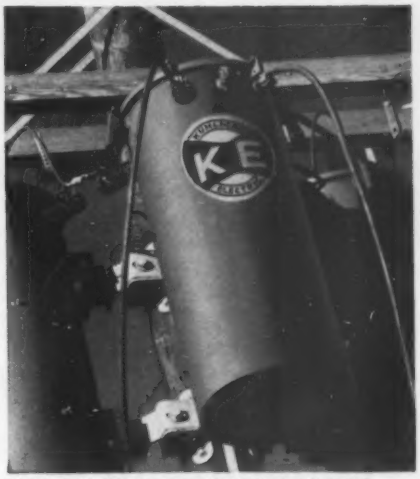
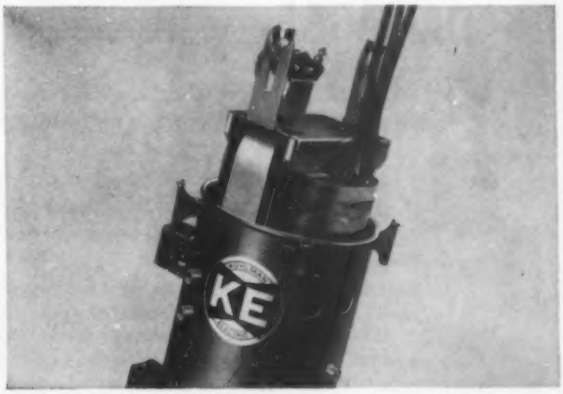
REDUCE OPERATING LOSS—New Kuhlman transformers' lower losses conserve generating capacity; put less drain per transformer on your system.



USE SMALLER TRANSFORMERS—to boost KVA per pole. New Kuhlman designs come in smaller tanks. The same KVA now takes up less room on the pole.

IMPROVE REGULATION—to fill new demands of "Electric-Living". New Kuhlman lower impedance, better regulation means less voltage drop and loss of revenue during heavy loading hours.



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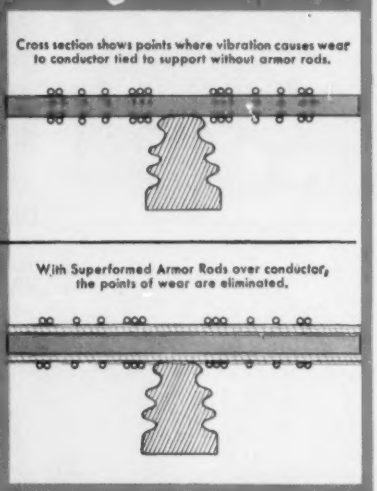
FANNER Superformed* ARMOR RODS

CUSHION CONDUCTORS against DAMAGE!


Cross section shows points where vibration causes wear to conductor tied to support without armor rods.
With Superformed Armor Rods over conductor, the points of wear are eliminated.

Even at low wind velocities, overhead lines are often subjected to thousands of stress reversals per minute due to aeolian vibration.

With Fanner Superformed Armor Rods installed at points subject to stress and abrasive wear, the conductor receives the best protection against vibration damage as well as electrical burning . . . and many expensive line repairs are eliminated.

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Meter practices

(Continued from page 73)

changes can be readily performed in the field with a single wrench for tightening the terminals.

Equalized monthly billings

A further trend towards lower utility costs is the increasing use of equalized monthly billings. In lieu of an economical method of automatic billing, many utilities have gone to bi-monthly readings with alternate months bill estimated. Semi-annual readings with the other months estimated have also been considered by some utility companies.

The advances in the meter art and applications is similar to that of much other electrical apparatus. Fundamental principles have changed but little, yet constant refinements of product and procedures will continue the trend toward greater accuracy and particularly toward more economical metering.

Washington report

(Continued from page 11)

states that the secondary boycotts are *illegal* "unless such secondary employer is engaged as a joint venturer, prime contractor, subcontractor, or co-contractor together with the primary employer involved in a labor dispute, in a construction project or similar undertaking at the site of such concerted activities."

The House Labor Committee's Bill would improve one aspect of labor law by wiping out the "no man's land"—that area in which the Labor Board will not act and the U. S. Supreme Court refuses to permit the States to act.

Often because of budget restrictions the Labor Board refuses to take the cases of small businessmen in interstate commerce. The House Labor Committee's bill simply would make it mandatory for the Labor Board to take all cases within its jurisdiction. (Cases outside the Board's jurisdiction would be within the states'.) Presumably the Board would get a bigger budget.

The Senate's Kennedy-Erwin bill approaches the problem differently. Where the Labor Board refused to act, states could act if they followed Federal labor law.

How this problem is solved is perhaps not as important as that it be solved.

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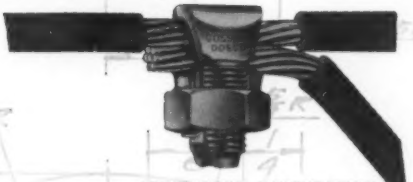
(Type GTX)
For cross, parallel and tee tap connections.

LIGHT DUTY VARIABLE LUG
(Type G)
For economical, all-purpose cable connections.



SPLIT BOLT CONNECTOR
(Type DS)
For taps, dead-ends, entrances, motor leads, junction boxes, etc.

VARIABLE TERMINAL
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Connects a wide range of copper conductors to flat bar.

TWO BOLT SERVICE CONNECTOR
(Type DSU)
For all service cable connections.
Best for larger sizes.

HEAVY DUTY VARIABLE LUG
(Type HL)
Takes various conductor sizes.
Quickly installed.

For YOU, the contractor...
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The products shown here are in constant demand by contractors and are fast moving stock items. All items accept a wide range of cables, thereby, minimizing the number of stock sizes. They are packaged in convenient quantities for ease of handling and are attractively labeled for quick identification.

Ask for pocket catalog, giving name of your distributor.

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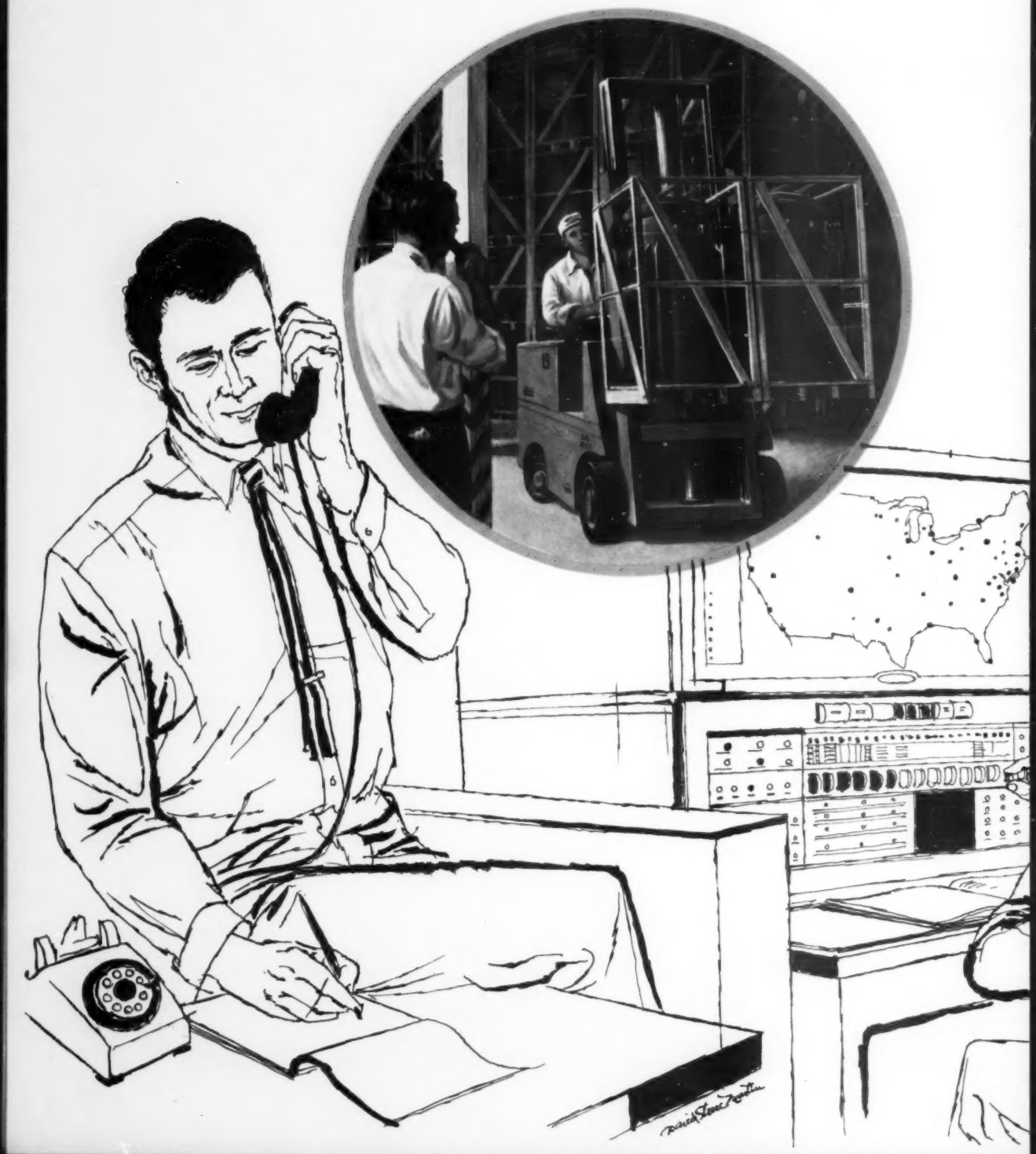

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You cut distribution transformer inventories when you take advantage of G.E.'s fast delivery. No need to keep dollars on your shelves or to spend needlessly on warehouse handling and storage. General Electric has more than one hundred district warehouses, backs them up with extensive factory stocks, and offers you 24-hour shipment when needed.

Overnight shipment is only part of General Electric service. Service Shops—48 of them—put emergency repair service within convenient geographic range; these facilities prove their worth especially in times of flood, fire, and storm. Other service includes repair and uprating of your old transformers as well as technical advice on product or system problems.

Before you buy another distribution transformer, check service—give your transformer manufacturer credit for the extra values he gives you. General Electric Company, Schenectady 5, New York.

431-79

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GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

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MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
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FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

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NOW AVAILABLE — IN COMPRESTO

19 wire All aluminum conductors — sizes up through 336, 400 CM

18/1 ACSR Conductors — sizes up through 336, 400 CM

Available with,
NEOPRENE, POLYETHYLENE or TWO COAT INSULATIONS

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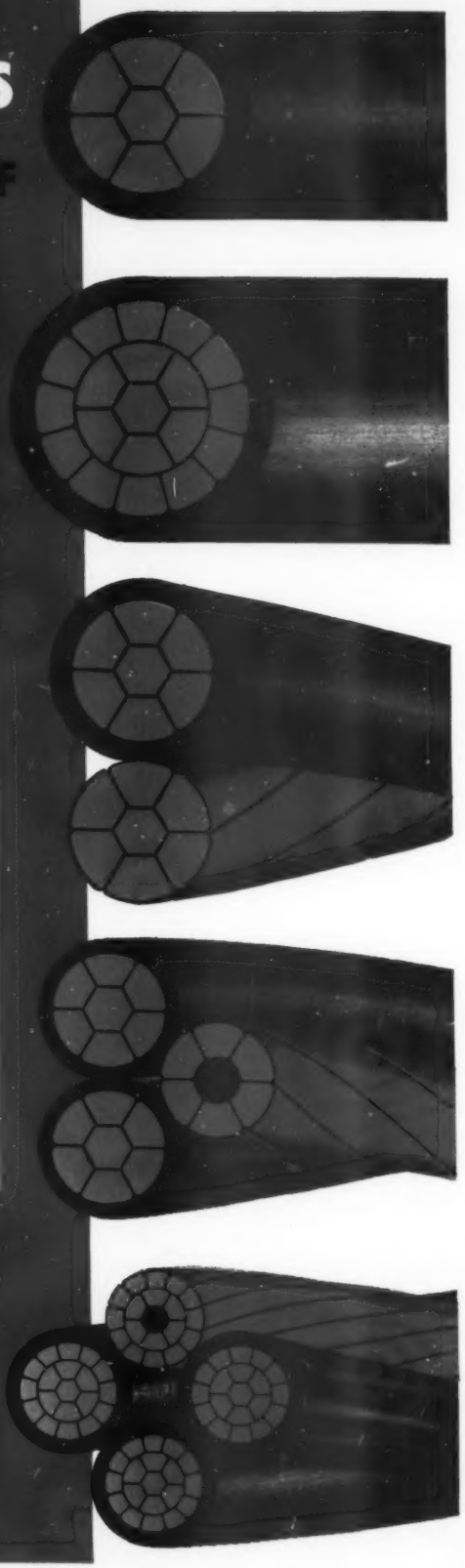
Developed for the growing need of secondary service cables.



Southern Electrical Company
CHATTANOOGA, TENNESSEE
METALS DIVISION
OLIN MATHIESON
Chemical Corporation

now! CUT *meter maintenance* COSTS *with a . . .* narda SONBLASTER® *ultrasonic cleaner!*

- Users report almost 90% savings!
- Clean complete assembly at one time!
- Eliminate hand labor & mechanical brushings!
- No special skills or training needed!

Cleaning meters and demand registers the old-fashioned way requires tedious, expensive disassembly... individual cleaning of each part... and finally, reassembly. It all adds up to labor costs as high as $9 or $10 per register—unless you use a Narda SonBlaster! Then, it's more like $1 per register, and this figure comes from an actual user.

Some more examples: One utility cleaned 16 registers in 36 minutes, including preparation. Another reports that switching to a Narda SonBlaster to clean cumulative demand registers as assembled units saves $11,000 annually, per 10,000 units procesed. And – retirement date is postponed as well.

How's it done? Merely fill the tank with solvent, flip the switch, and submerge your complete assembly. In minutes...seconds...every shaft, gear, bearing and part is meticulously clean! And with no physical labor!

300-watt G-1501 Generator,
5-gallon NT-1505 Tank
Other models from $175
2-year guarantee on all units

$695

Join the dozens of utilities now using Narda SonBlaster. We'll be glad to give you facts and figures to show how *you* can start saving *immediately* on cleaning meter registers, timing devices, and instruments in general. Write us, outlining your problem. Address: Dept. ES-3.

More SonBlasters sold than all other ultrasonic cleaners combined!

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Subsidiary of The Narda Microwave Corporation

Good liaison aids line relocation at roadwork sites

By R. E. L. Shirley*
Distribution Field Supervisor
Georgia Power Company
Atlanta, Ga.

◆ THE RAPID population growth in Georgia is making land scarce along major highway areas. A redistribution of the population has made lands which are suitable for highways and utilities even scarcer. In many areas today, and in many more areas in the future, the pressure of population increase and shifting of same will make it most difficult to secure separate strips of land for both the highway and the utilities.

In the past the highways and utilities have been bedfellows on a more or less voluntary basis. We predict that land scarcity in the future will make it become more and more a necessity for joint usage of the same land channels.

There is a great need for a constant interchange of information between the engineer who plans highway routes and the engineers who plan routes for the various public utilities involved in the area. The highway engineers and the utility engineers should work together to determine what facilities are now in the route which the new highway will follow; determine what precautions must be taken by bulldozer operators to avoid breaks in existing water, gas, electric or communication lines; also jointly check for giving proper precautions to crane and shovel operators so as to avoid contact with high voltage wires. Joint planning is necessary to determine what utility facilities will be needed for traffic signals, roadside rests, fire protection, highway lighting, and the like.

Before we start to discuss the details of cooperation and liaison, it is necessary to clear up certain mental attitudes. Some utility people are prone to think of the Highway Department, not as providers of good roads for transportation of people and commodities, but as takers of private rights of ways and imposers of burdensome restrictions causing unnecessary work.

On the other hand, some highway people think of utilities, not as providers of necessary services, but as private businesses run for profit. This kind of thinking will hinder and postpone productive liaison work. This kind of thinking must give way to the broader mutual understanding and recognition that transportation, communication and distribution of electric energy, gas and other services are all vital and necessary factors for the well-being of the general public!

Utility organization

The Georgia Highway Department is geographically divided into five divisions. Our company is geographically divided into seven operating divisions which are in turn divided into thirty-three districts. Each of these districts has a small engineering and construction force which normally handles our routine service extensions, maintenance, and operating problems.

No big engineering jobs could be handled quickly by this staff; therefore, it would be of great assistance to have as far in advance as possible the alignment prints and routing of all highway projects which would either give our existing personnel ample time to prepare their engineering plans and estimates of cost or would allow time enough to send in additional engineering forces to assist these districts in the preparation of their engineering plans and estimates.

The majority of our rural extensions are on private rights-of-way but are located in relatively close proximity to the outer boundary of state highway or road rights-of-way; and in many ininstances where the highway is widened it would become necessary to locate these facilities on the newly acquired highway rights-of-way due to the property owners' objections to giving up more land than they had already given up for road construction purposes. The state and federal highway departments and the utility company should know early that such conditions exist in order to effect careful planning and timing.

In all of the cities and towns the company's pole and underground facilities are located through necessity along the corporate curb lines or beneath the street surfaces under a profit sharing type of franchise. It is our supposition that access roads, thoroughfares and ex-

*This article has been adapted from remarks made by Mr. Shirley at the annual Georgia Highway Conference held recently at Georgia Institute of Technology.

pressways will greatly affect our urban type facilities.

In the adjustment of the utility facilities minute engineering plans will have to be made and copies of these drawings furnished all parties concerned because of the nenessity of maintaining continuity of service while construction work is in progress. This will certainly require the fullest cooperation between the utility, the project engineers and the utility forces and, in our opinion, will require a lot of give and take by all parties concerned.

In the case of transmission lines and structures where steel construction is used, we can visualize some delays if proper advance planning is not adhered to because of the time lag in structure and design and the acquisition of the steel from the manufacturers.

Contractors to be used

It is the Georgia Power Company's intention where major projects occur to acquire outside help by the employment of capable contractors.

Unfortunately, due to the engineering shortage no outside engineering help will be available; but we will make every endeavor to aid the outlying territories when it becomes necessary by temporarily assigning additional engineering personnel to the troubled areas.

We request the cooperation of advance planning and notifications by the state and federal bureaus of their intentions and plans far enough in advance to permit us to properly coordinate our work so as to eliminate all possible delays and hindrances of the great program which is now in full swing. There have been some instances where a delay in handling paper work has retarded the clearing of utility facilities.

Probably the greatest help in expediting highway projects is to have a competent member of the highway staff handle the liaison work of informing, discussing and coordinating the removal and relocation of conflicts with utilities. In our opinion, a wide-awake and capable man in this job can be the difference between success or failure of productive liaison work.

Following is a procedure that has been worked out for efficient handling of the removal and relocation of utility facilities in conflict with highway work:

Plan of procedure

(1) When the construction plans are ready for plans, specifications and estimates, field inspection prints are forwarded to the utility owner for the preparation of tentative estimates covering the cost of the proposed removal and relocation of the utility facilities in conflict with highway construction.

When these plans are sent out, the name of the utility owner is shown on them. As soon as possible after receipt of plans, the utility representative should meet with the proper highway representatives in the field, and they should go over the project together to determine if all facilities which need to be relocated are shown on plans. The need for revisions of plans, if necessary, should be determined at this time. If requested to do so, the utility then makes and presents to the highway department a preliminary estimate.

(2) After plans, specifications, and estimates, inspection and necessary plan revision, prints are furnished to the utility owner for the preparation of detailed estimate with plans showing the present location of the utility facilities in conflict and the new location of such facilities to clear highway construction.

If the first joint field inspection was complete and thorough, it will not be necessary to make a second joint inspection after final plans are received by the utility.

If it is not necessary to make this second inspection, then the utility proceeds with making a detailed estimate and construction drawings for clearing the project. This information is forwarded to the general office of the highway department as quickly as possible.

(3) The plans and estimates furnished by the utility owner are forwarded to field division personnel for field review with the utility owner to check the necessity as well as sufficiency of changes along with determination of prior rights.

A highway division engineer checks the utility estimate and plans, usually in the field, with utility representative. The plans

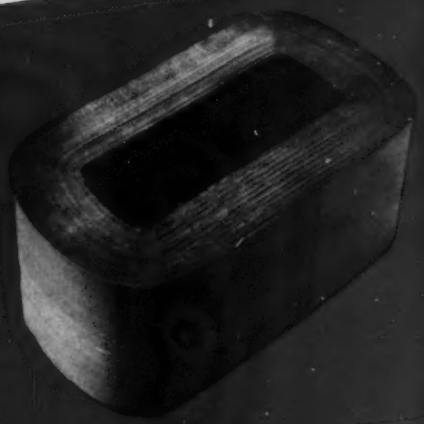
(Continued on page 142)

MOLONEY

DISTRIBUTION TRANSFORMERS OFFER LOWER LOSSES LOWER EXCITING CURRENT LOWER IMPEDANCE IMPROVED REGULATION BECAUSE . . .

CORE

These distribution transformers have the entirely new MOLONEY CORE. In this core a low reluctance path for the magnetic lines of force is provided by bridging the cuts in the laminations, resulting in substantially lower exciting current.



COIL

The coils have lower impedance to provide a lower internal voltage drop at all loads. This means that during peak load periods Moloney's distribution transformers can carry higher overloads at the same permissible regulation.

Redesign of the entire line of Moloney Distribution Transformers has brought about significant improvements in the mechanical design and in the electrical performance.

Inside . . . and outside . . . Moloney Distribution Transformers are designed and built for long, efficient, and economical operation. Specify Moloney Transformers . . . All Along The Line. ME60-33

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

MOLONEY ELECTRIC COMPANY

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

New tool device reduces cost of hot line taps

◆ AN INGENIOUS DEVICE that virtually defies verbal description will soon be simplifying a job and saving costs for electric utilities.

The device, available from Aluminum Company of America, is called a "clamp gripper tool for stick operation." The job it performs is installing clamps on "hot" electrical power lines. Savings average 80 per cent of the materials cost of clamps for such installations.

Use of the tool makes it possible to apply standard parallel groove clamps to energized primary distribution or transmission lines. Its use makes unnecessary the expensive hot line clamps which have heretofore been used in making "hot" connections.

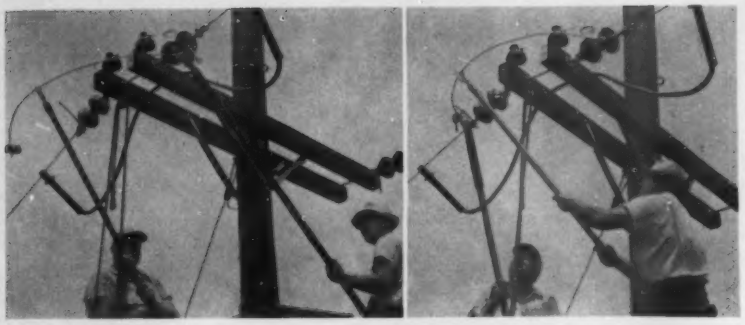
Devised by an Alcoa engineer, the tool in effect performs the functions of the mechanism of a hot line clamp, but can be removed from the line after the simple parallel groove clamp is installed. Operated by the hook of a hot line stick, the new tool may be used with most common "shotgun" type hot line sticks.

The tool—an assembly of components in a cast aluminum housing—is being manufactured by Standard Coil Co., Pittsburgh, and represents a joint development of Alcoa and Standard Coil. It will be sold exclusively by Alcoa, as a Standard Coil product, and will be available through Alcoa sales offices.

Advantage of the new tool is economic. It makes possible large savings in hot line clamping materials by, in essence, replacing the complex mechanism that comprises the major part—and cost—of the conventional hot line clamp. Alcoa estimates that the normal utility line crew will save the cost of the tool within the first month of use.

The efficiency of a joint made by a parallel groove clamp installed with the aid of the new tool is fully equivalent or superior, electrically and mechanically, to

(Continued on page 143)

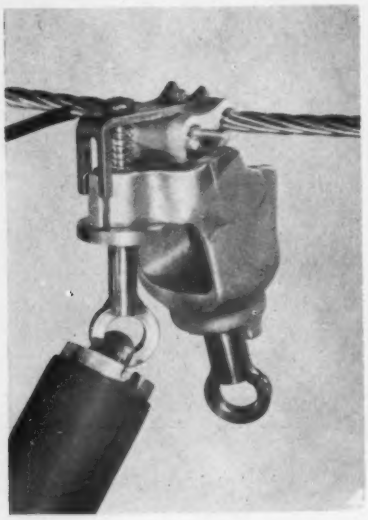


Linemen of Nantahala Power and Light Co., Franklin, N. C., are using new tool to install a 12 kv jumper. The main employment of the new tool will probably be the installation of transformer taps.

(1) Tap wire seated in parallel groove of clamp. Clamp inserted in saddle of clamp gripper tool.

(2) Tool with clamp and tap wire hooked to hot line stick. Upper half of groove put over hot line.

(3) Stick tension released and clamp tightened fully onto line by revolving eye bolt with stick hook.



(4) Stick hook transferred to hold-down eye bolt. Bolt is loosened to release entire tool from clamp.

The success of your sample testing of tomorrow depends on the meters you buy today

Simplification of testing procedures can save your company up to 50% in meter testing costs. But the success of sample testing depends on the overall accuracy of the meters on your lines. 5 and 10 amp meters put a definite roadblock in the path of random sample testing by requiring tests up to ten times as often as modern meters. The meters you buy today can directly affect your sample testing of tomorrow.

Utility commissions are much more likely to approve the use of cost-saving testing methods if the meters on your system have sustained accuracy.

Sangamo J2 Meters provide such sustained accuracy with the highest torque and the slowest disk speed of any singlephase watthour meter. The Class 200 J2 Meter is adequate for *all* services . . . is accurate at 1½ amps . . . with ample capacity for the loads of the future. An analysis of the advantages of the J2 Meter is detailed in the "Meterman's Check List." Write for your copy today.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JH59-9

Notes on new utility equipment

Deadend clamp features high holding power

STRAIGHT-LINE deadend clamp for 3/0 (7 str) through 350 MCM (37 str) alumium and 3/0 (6-1) through 336.4 MCM (26-7) ACSR has been added to its CUW-R line or deadends by Burndy Corp., Richards Ave., Norwalk, Conn. The new size deadend clamp is designated CUW32R-E.

Like other CUW-R deadend clamps, the CUW32R-E is designed for flexibility to accommodate load changes. Modified V-groove and deep pocket produce a two-way snubbing-wedging action, resulting in high holding strength.

To make these clamps easier to work "hot," they are compactly designed with humpback cotter pins and headed clevis pins to facilitate covering with line hoses. Cable can be threaded into the clamp without removing the saddle, while captured U bolts prevent installing the saddle backwards.

Write U-901 on reply card, page 21.

Aluminum accessories offer greater efficiency

A NEW LINE of tubular wrought aluminum accessories for bare electric power conductors — offering greater efficiencies at lower cost — has been announced by Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

For use with stranded aluminum and ACSR, the new accessories — among which are joints, deadends, jumper terminals, and repair sleeves —are fabricated from drawn tube. Standard sizes range from 336.4 MCM, 26/7 ACSR, through 1,590 MCM, 54/19 ACSR. Special sizes are also available.

Inherent handling and installation advantages of the new accessories result from the tubular design. Cable insertion is facilitated by the smooth interior surfaces of the drawn bore.

With the new accessories now available, Alcoa offers a full line of wrought accessories for all conductors from #4 AWG through 1,590 MCM.

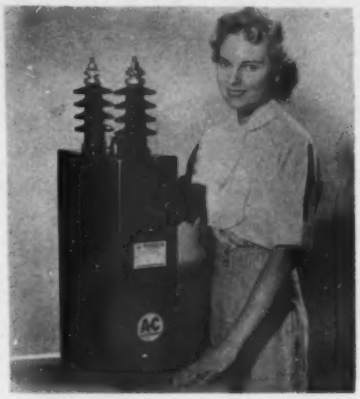
Write U-902 on reply card, page 21.

Power factor capacitors for immediate delivery

POWER FACTOR capacitors are now available from Allis-Chalmers Mfg. Co., 938 S. 70th St., Milwaukee 1, Wis. Entry into the power factor capacitor field follows five years of design and development work aimed at over-all capacitor improvement.

Capacitors are available for immediate delivery in two sizes, 25 and 50 kvar, 2400 through 7960 volts.

The A-C capacitors are built to rigid specifications, utilizing high



quality, low loss materials, foil cooling, and extra low drying and degasification pressures.

Included in the capacitor package are pole-type racks, stacked racks, voltage sensitive controls, voltage sensitive current compensating controls, current sensitive controls, switches, fuses, and other accessories. Factory assembled, the substation and pole-mounted capacitors are easily installed.

Write U-903 on reply card, page 21.

Plastic-coated covers for distribution transformers

WESTINGHOUSE Electric Corp., P. O. Box 2278, Pittsburgh 30, Pa., has made available plastic-coated covers and cover hardware on all pole-type units having cover-mounted bushings. The

Ye canna make a more canny buy!
MADE OF
DURALOY
FOR QUALITY
THE FINEST IN DIE CASTING
ECONOLINE
DEPENDABLE CONDUIT FITTINGS
Your Best Connection for Quality Fittings
DURO SALES CO. • 2210 So. Davie Avenue • Los Angeles 22, Calif.

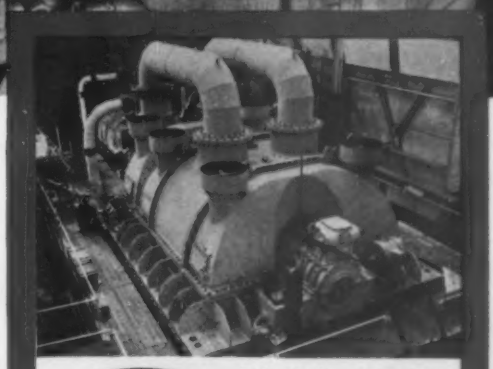
DEVELOPING WORLD PROSPERITY

SOUTH AFRICA

Vierfontein Power Station, South Africa — twelve 'ENGLISH ELECTRIC' 30 MW turbo-alternator sets. These sets, running at 3,000 r.p.m., are designed for steam conditions of 600 p.s.i.g., 825°F at the turbine stop valve.

GREECE

St. George's Bay Power Station, Athens. This 60 MW turbo-alternator set and a 14.25 MW topping set have been supplied for the extensions to this station which was originally equipped by 'ENGLISH ELECTRIC' in 1929 with three 15 MW sets.



GREAT BRITAIN

High Marnham Power Station, England. Works tests on the first of five 200 MW, 3,000 r.p.m. three-cylinder turbines which will operate at 2,350 p.s.i.g., 1,050°F at the turbine stop valves, re-heat to 1,000°F.

Backed by over 55 years' experience, 'ENGLISH ELECTRIC' is today manufacturing steam turbo-alternator sets amongst the largest in the world, including two 275 MW units and five 200 MW units for the Central Electricity Generating Board of the United Kingdom. Many hundreds of sets, both large and small, have been supplied to public utilities and industry throughout the world.

'ENGLISH ELECTRIC' products cover all aspects of the generation, transmission and utilization of electric power. Contracts have been completed and others are in hand for many major American power projects.

'ENGLISH ELECTRIC'

Agents: ENGLISH ELECTRIC Export & Trading Co. Ltd., 750 Third Avenue, New York 17, N. Y. Tel.: Murray Hill 7-0303

Sub Agents:

James I. Metcalf & Co. Inc., 701 United Pacific Building, Seattle 4, Washington. Branch offices in San Francisco, Los Angeles, Portland, Phoenix, for Alaska, Arizona, California, Idaho, Montana, Nebraska, Nevada, Oregon, Utah, Washington and Wyoming.

Osgood and Associates Inc., 908 Spring St., N. W., P. O. Box 7383, Station C, Atlanta 9, Ga., for Alabama, Florida, Georgia, Kentucky, South Carolina and Tennessee.

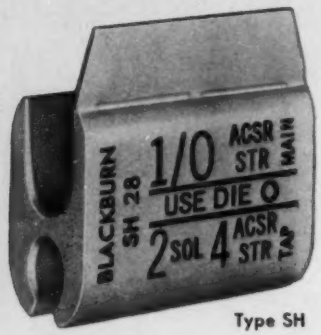
Electron Equipment Co. Inc., Peabody Bros., 1050 Constance St., New Orleans, 13, La., for Louisiana and Mississippi. 2903 St. Louis St. at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa, for Arkansas, New Mexico, Oklahoma and Texas.

Service facilities are available through three large Canadian plants.

ENGINEERED INTO
BLACKBURN'S
COMPRESSION CONNECTORS

High Conductivity-

Blackburn has engineered all compression connectors shown to fit your present tooling program—and added advantages to meet engineers' and linemen's requirements.



Type SH

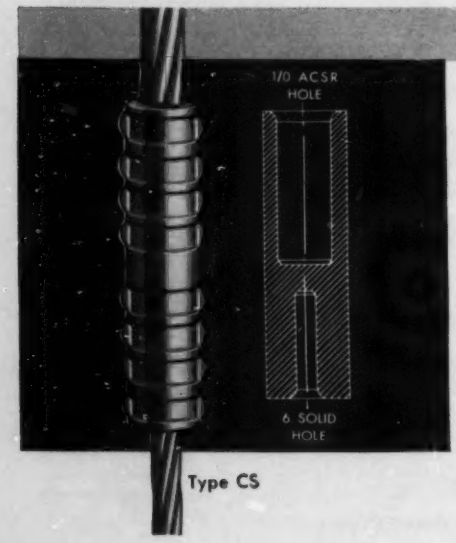
Type HT Prefilled

Type SH Prefilled

Type HT

Standardization now possible with Blackburn "H" frame connectors

- **Designed to fit the tools you already have for applying "H" frame type connectors.**
- **Full length tab completely seals out moisture, easiest to bend and install!**
- **Shot blasted to improve conductivity and retard corrosion.**
- **Prefilled with Blackburn's superior oxide-inhibiting compound, Contax, in easy-tear tab vacuum package.**
- **Color fast, large, easy-to-read lettering.**
- **Type HT is reversible, both grooves "open". For large aluminum tap to smaller copper main. Also used for dead ending.**



Type CS

You get higher conductivity with Blackburn service entrance sleeves

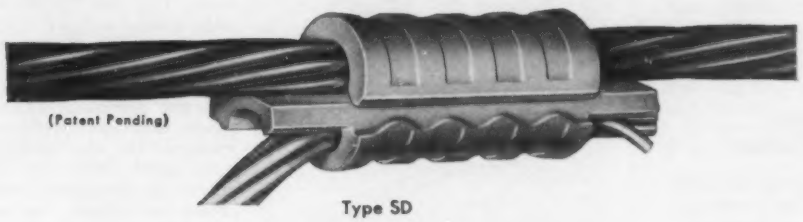
Blackburn—and Blackburn *alone*—provides greater contact area where needed, to assure greater conductivity. This is accomplished by increasing hole depth as the diameter of the conductor is increased, thereby providing more contact area for the conductors being connected.

The Color Coding is *printed* for quick, positive identification.

The sleeves' ends are sealed with Aluminum Sensitized Tape, which is easy to puncture . . . and, if a particle of the seal is pushed into the chamber, the particle is conductive.

Contax, Blackburn's superior oxide-inhibiting compound, is already in these sleeves *in measured amount*. Won't squirt out on glove or in face. And the solid center stop in a Blackburn Sleeve assures proper distribution of the inhibitor around the conductors. Designed for tooling you have.

High "Use-Ability"

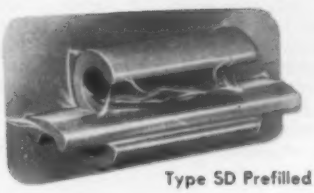


(Patent Pending)

Type SD

Exclusive drip-guard separator in Blackburn 6-frame tap connector gives *extra* protection to bi-metallic connections

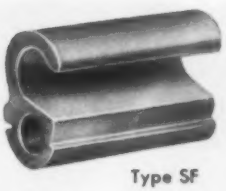
- Spacer allows SD Connector to be used for bi-metal connections with the tools you already have for "C" Frame type connectors.
- An economical substitute for "L" taps, since extended drip guard gives extra insurance against corrosion products bridging the bi-metallic gap.
- A true *two-handed* connector, very adaptable for hot line work.
- Shot blasted for highest conductivity and corrosion resistance.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SD Prefilled

Type SF

- Recommended for aluminum to aluminum.
- Spacer gives better protection against strand breakage.
- Can be installed with same tooling used for Type SD.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SF

Type TR

Blackburn neutral repair sleeves save dollars on triplex services

- Salvage short lengths of pre-assembled service drop cable with Blackburn Sleeves.
- Designed for and tested with the tools you already have.
- Extra length engineered for neutral pullout values in keeping with dead end devices.

See JB Catalog 858 for Tooling INFORMATION

LIVE BETTER ELECTRICALLY

JASPER BLACKBURN CORPORATION

1525 Woodson Rd., St. Louis 14, Mo. • WYdown 3-9430

Plasticlad plastic-coated parts are now a standard feature on all units of this type rated from 5 through 333 kva.

The plastic coating is on the main and hand-hold covers, the eye bolt, and on the hand-bolt to provide adequate insulation protection against line-lockout from birds and squirrels.

The covers have excellent resistance to corrosion and abrasion. Neither salt, alkali, acids, nor temperatures up to 400 degrees F have an observable effect on the coating material.

Because of their color, transformers with plastic-coated covers can be easily identified in the field.

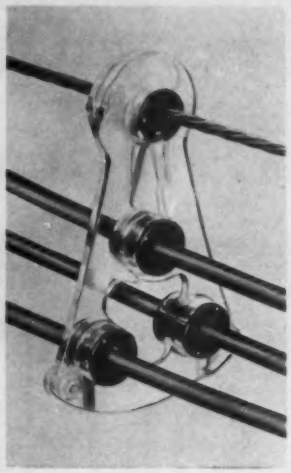
Write U-904 on reply card, page 21.

One-piece cable spacer features unit construction

A NEW, one-piece, "wrap-around" type of cable spacer for overhead distribution systems has been announced by PLM Products, Inc., 3862 W. 150th St., Cleveland 11, Ohio.

Designed for use with the new, more compact, messenger-supported aerial cable systems, the PLM cable spacer features unit construction that eliminates need for bolts, nuts, tools, or any separate parts to install. Split neoprene grommets which compress around cables and messenger are preassembled in position in the spacer in order to eliminate handling and positioning of separate parts in the field.

Spacer is installed by hanging



spacer on messenger, then "wrapping" it around conductors, and snapping it shut into latched position. Grommets are half-sectioned. The sections fit snugly into place around each cable as "wraparound" action is completed with spacer.

Substantial savings in time and installation costs are claimed as a result of the PLM one-piece design.

"Wraparound" spacers are designed of Lucite and supplied to fit cables from ⅜" to 1" outside diameter, for 3-phase cable systems to 5 kv rating.

Write U-905 on reply card, page 21.

Suspension insulators offer corrosion protection

THE FUTURA suspension insulator series has been introduced by Ohio Brass Co., 380 N. Main St., Mansfield, Ohio.

Each of the insulators in the new series features a corrosion intercepting sleeve (C.I.S.) designed to protect the porcelain against corrosion stress. Corrosion problems in all segments of the electric power industry have been increasing, Ohio Brass points out, and will continue to increase as voltages rise and air-borne contamination spreads.

As corrosion deposits develop between the C.I.S. sleeve and the porcelain, the sleeve gradually yields so that no severe stress is exerted on the porcelain, O-B states.

Offered in 18,000, 25,000 and 36,000-pound M. & E. ratings, the new insulators have high strength with less weight and no increase in cap diameter over existing designs. The

HOW RELIABILITY IS BUILT INTO THE MAGNE-VALVE ARRESTER

by R.W. FRAHM—Manager of Lightning Arrester and Cutout Marketing

Every General Electric Magne-valve arrester is subjected to exacting factory tests to assure high mechanical and electrical strength.

Each Thyrite* valve element disk receives multiple impulse discharges to stabilize and measure its discharge voltage characteristics. Each assembled unit receives a production line 60-cycle sparkover test and a test to assure freedom from radio noise. A vacuum test ascertains the arrester housing's ability to seal out atmospheric moisture. Thus, each functional element of the arrester is separately checked. Units which fail to measure up in any area are immediately rejected.

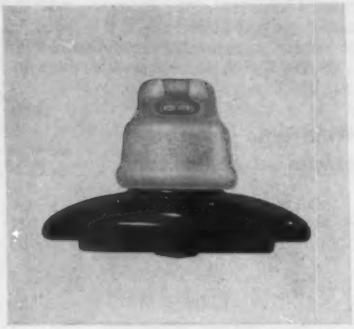
Field experience has proven that these tests provide you with the best distribution arrester available. Since 1953, when General Electric introduced the first magnetic gap controlled distribution arrester, 1,300,000 arrester years of near-faultless service have been compiled—substantial evidence that quality and reliability are built-in features of every G-E Magne-valve arrester.

We'd like to tell you more about our complete line of distribution arresters. Contact your General Electric representative or write Section 435-21, General Electric Co., Schenectady, N. Y.

*Registered trademark of General Electric Co.

GENERAL ELECTRIC

Exacting factory tests assure



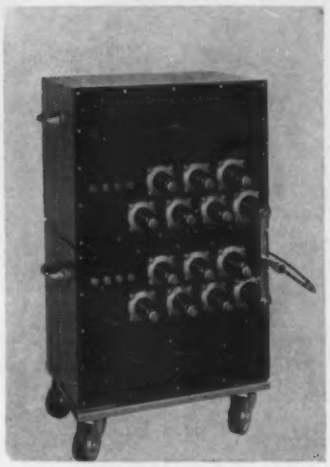
new 25,000 unit, for example, weighs just 12 pounds compared to 14.6 pounds for ASA standard 52.5 units.

Write U-906 on reply card, page 21.

Uniload test set tests instrument transformers

THE POTENTIAL transformer Uniload test set from Knopp, Inc., 1307 66th St., Oakland 8, Calif., is for the testing of instrument transformers of all commercial voltages up to 14,400 volts.

The new Knopp Uniload test set is multirange, and it supplies to the transformer-under-test the following voltages: 120, 240, 480, 600, 2,400, 4,200, 4,800, 7,200, 8,400, 12,000, and 14,400 volts. By means of a Knopp precision multirange potential transformer standard, incorporated in the test set the transformer-under-test can be accurately tested at the foregoing voltage values. The secondary is 120 volts. With the Knopp precision standard transformer and with a secondary burden of 15 volts-amperes, to give an example, the ratio



of the precision transformer is well within .02% and the phase angle is well within 5 minutes.

The Uniload test set consists of three major parts: a Type WP-14000 Knopp precision multirange potential transformer; a Type LP-14000 Knopp heavy-duty loading transformer; and a rubber-tired carriage to provide mobility to the complete Uniload test set.

Write U-907 on reply card, page 21.

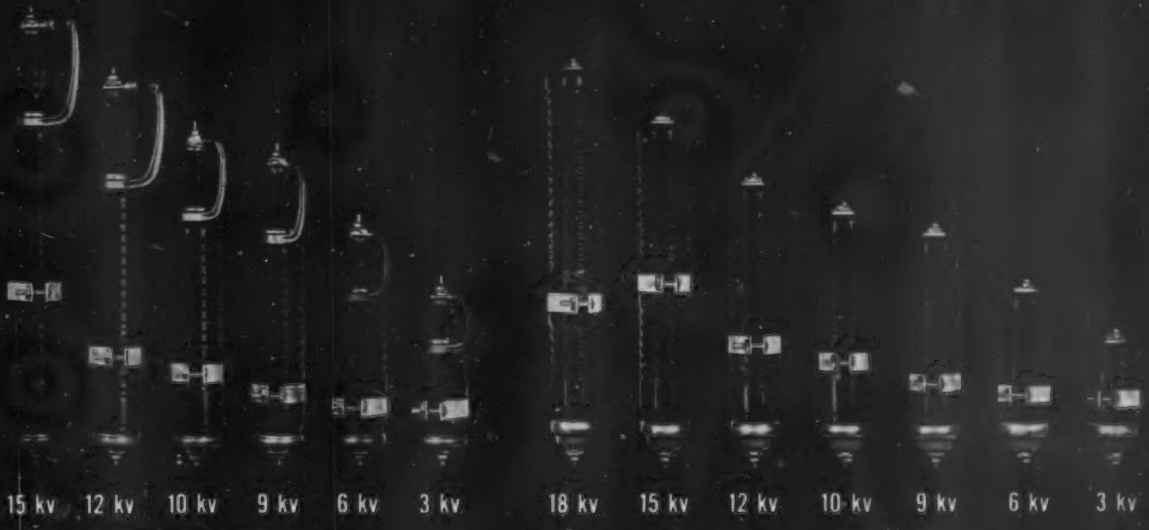
Installing screw anchors averages 5 to 8 minutes

A NEW LINE of power-installed screw anchors is offered by the A. B. Chance Co., 210 N. Allen St., Centralia, Mo. These anchors are designed to be installed with the power hole-diggers used by utilities for line construction.

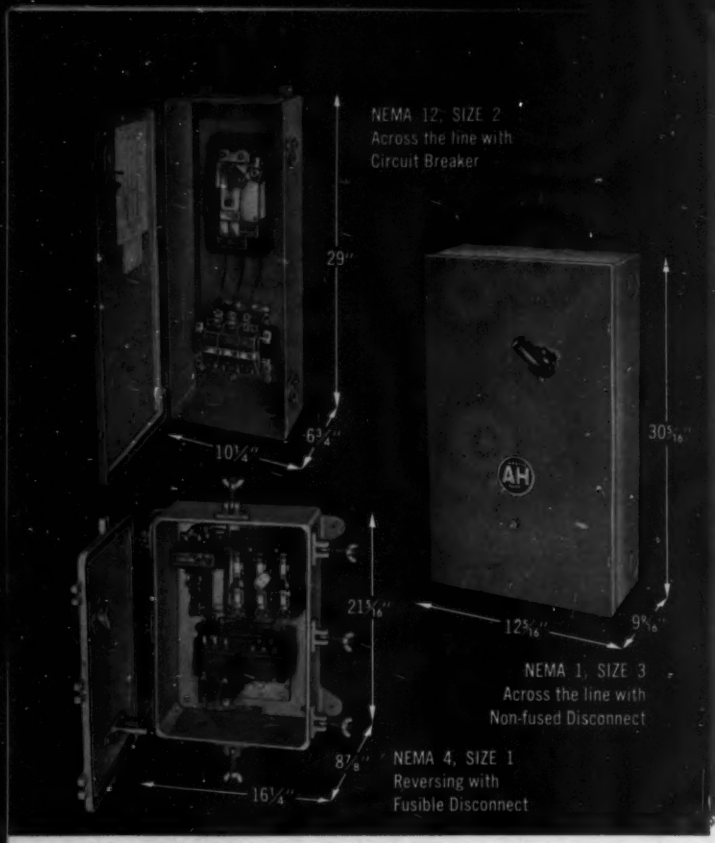
Power-installed screw anchors average only 5 to 8 minutes for complete installation. And they can be installed in all types of soil except extremely rocky ones.

These anchors are adapted to power equipment by means of a special installing wrench. (This wrench does not come with the anchors; it is purchased separately from Chance.) The wrench fits over the anchor and carries the installation torque. It attaches to the hole-digger's drive shaft with the auger head removed. Or by means of an adapter (not made by Chance but available from other

the reliability of General Electric
Magne-valve distribution arresters



GENERAL ELECTRIC



Announcing: **A COMPLETE LINE OF COMPACT, LIGHTWEIGHT COMBINATION STARTERS**

Sizes 0, 1, 2, and New Sizes 3 and 4—and NEW CAST ALUMINUM WEATHERPROOF and EXPLOSIONPROOF ENCLOSURES

Starters are of exclusive "Right Angle" Design which brings important installation, maintenance and performance benefits. For convenience and safety, unit is front operated by means of Fused or Unfused Disconnect, or Circuit Breaker. Circuit Breakers are Instantaneous or Thermal Magnetic Trip Types. *No other line offers enclosures that facilitate mounting and handling like the new cast aluminum NEMA 4 Weatherproof and NEMA 7 and 9 Explosionproof – Enclosures that are one-half the weight of old-style cast iron boxes.* Other available enclosures: General Purpose (NEMA 1) and Industrial (NEMA 12 – oil-tight and dust resistant).

Write for new folder on A-H Combination Starters to: The Arrow-Hart & Hegeman Electric Company, Dept. ES, 103 Hawthorn St., Hartford 6, Conn.

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APPLIANCE SWITCHES • WIRING DEVICES

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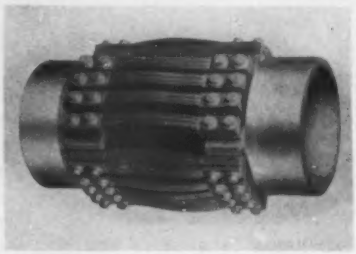
manufacturers), it attaches to the not-removed auger head. The wrench is easily removed for re-use.

Write U-908 on reply card, page 21.

Weld-type aluminum expansion connector

SOUTHERN STATES Equipment Corp., Hampton, Ga., is now able to furnish a 10,000 ampere generator bus,



expansion connector. It is weld-type aluminum and is designed to fit a 12¾-inch outside diameter aluminum tube.

Write U-909 on reply card, page 21.

Improved insulator provides greater leakage distances

IMPROVED five-inch fog-type suspension insulators are being offered by Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis. These insulators provide greater leakage distances, higher impulse and low frequency flashover, and reduced radio interference at higher voltages.

Features that assure reliable performance in service are smooth, non-

abrasive, self-cleaning surfaces, high-strength brown glaze, high-grade malleable iron or forged steel hardware, and impact-resistant, wet-process porcelain shell.

Continuous inspection plus rigid mechanical and electrical tests result in uniform mechanical and electrical characteristics.

Write U-910 on reply card, page 21.

Relay tester features three current sources

A PROTECTIVE relay tester featuring three metered current sources is a new product of the Multi-Amp Division of Multi-Amp Electronics Corp., P. O. Box 217, Union, N. J. The unit is suitable for field and laboratory testing particularly by electric utilities. This all-inclusive unit is designed for testing a full range of a-c current and voltage activated relays, also circuit

breakers, current transformers, and insulation resistance of such equipments. Line cord and test leads are supplied.

The Multi-Amp tester, Model IDR-35/MT-1, has a continuously adjustable transformer for current or voltage load, plus suitable instrumentation. One metered current source is a reactor circuit available for general relay testing. The reactor suppresses harmonics caused by saturation of core structure on certain types of relays; and the third source is direct current for target and seal-in relays. The a-c voltage source is also metered.

Write U-911 on reply card, page 21.

Aerial lift mounts on standard truck chassis

A NEW SERIES of completely hydraulically operated aerial lifts has been announced by Truck Equipment Co., 3963 Walnut St., Denver, Colo.

These mobile units mount on standard truck chassis and are capable of placing an overhead worker to a height of 100 feet. The boom is a

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T-1651 T-1652 T-1653

NEW ARROW-HART HIGH QUALITY WALL PLATES

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WILL NOT RUST. Designed for use with H&H Specification Grade Interchangeable Wiring Devices, these slim, trim wall plates are ideal for use in movable metal partitions for industrial or commercial applications. Available with 1, 2 or 3 openings, or blank.

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Have You Seen the New Arrow-Hart Combination Starters?

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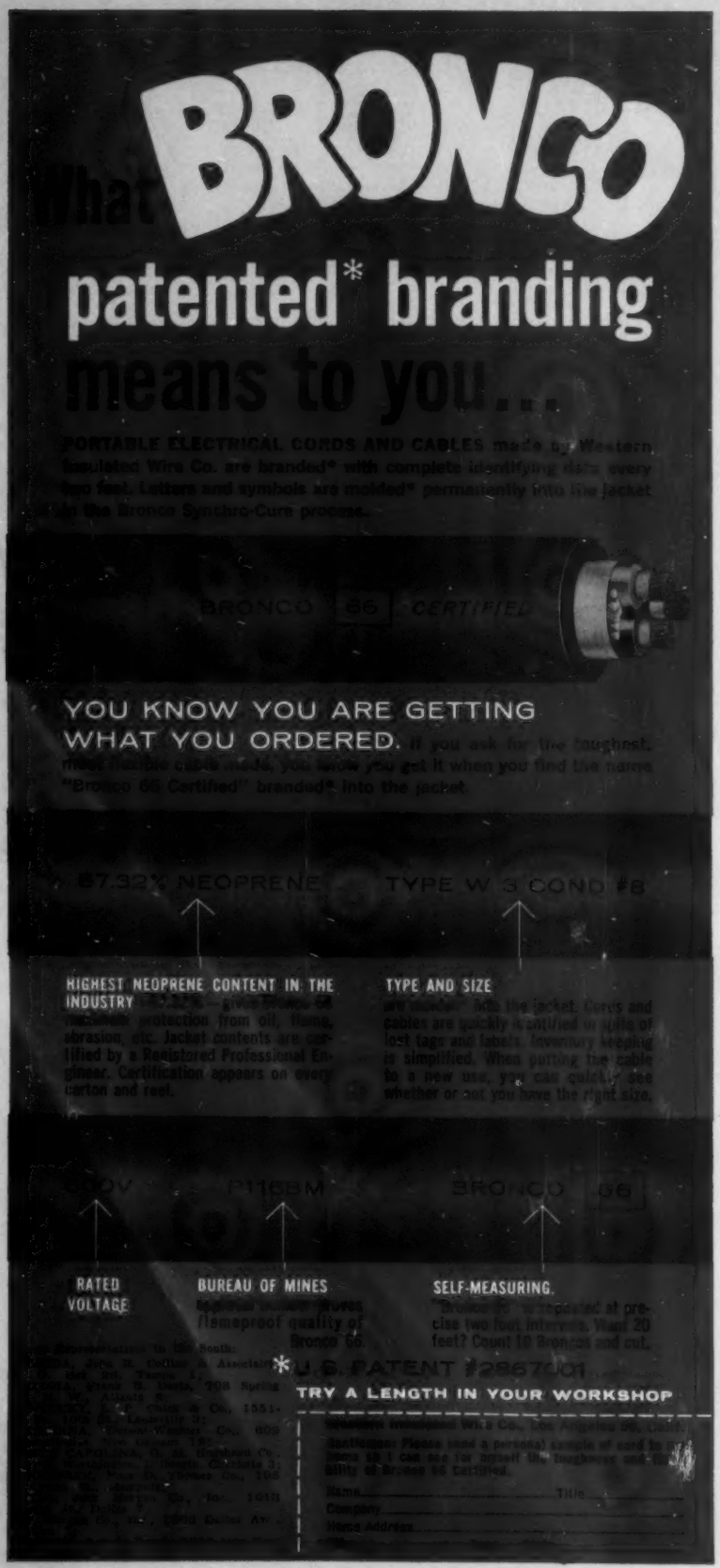
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PORTABLE ELECTRICAL CORDS AND CABLES made by Western Insulated Wire Co. are branded* with complete identifying data every two feet. Letters and symbols are molded* permanently into the jacket by the Bronco Synthro-Cure process.
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YOU KNOW YOU ARE GETTING WHAT YOU ORDERED.
If you ask for the toughest, most flexible cable made, you know you get it when you find the name "Bronco 66 Certified" branded* into the jacket.
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flameproof quality of Bronco 66
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two-stage telescoping design which mounts compactly on the truck in transport position yet rapidly erects to desired position. Because of extended reach, the Truco "Super" series comes complete with outriggers for added stability.

Two standard models have been built for high overhead work, warehouse work, and aircraft and rescue work. Both lifts have full 360 degree rotation, raise 75 degrees from horizontal, and use either PTO or separate engine to power dependable hydraulic system. Basket has rated capacity of 500 pounds.

Write U-912 on reply card, page 21.

Individual meter panels designed for mobile homes

MANY OF THE NATION'S most modern trailer parks are now offering their tenants the individual convenience of mobile home meter panels, from United Enterprises, Dept. P-1, 15735 S. Paramount Blvd., Paramount, Calif. Completely pre-wired and factory assembled, United meter panels can be readily installed by one man with substantial savings in time and labor for both the contractor and park owner.

The snugly fitted hinged cover assures rain-tight, weather-proof protection and can be securely locked to prevent tampering, vandalism, or children's accidents. The plug-in receptacle is conveniently located at the bottom of the enclosure, giving the unit a modern, uncluttered appearance and permitting immediate trailer hook-up for new tenants.

United meter panels are constructed of heavy gauge, galvanized steel which has been Irridite processed to assure a permanent bond for the attractive baked enamel hammertone finish. All meters are of the latest design, scientifically recalibrated, and unconditionally guaranteed for one year.

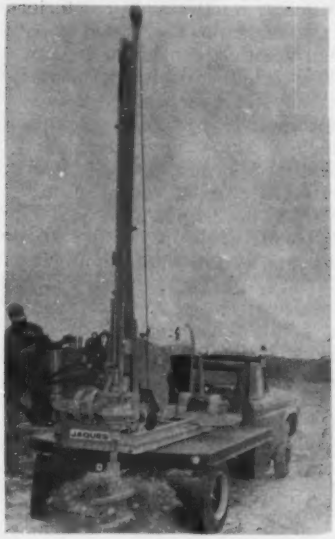
Write U-913 on reply card, page 21.

Hydraulic earth augers completely re-engineered

TEXOMA ENTERPRISES, Inc., Sherman, Texas, has announced that they are now manufacturing the redesigned Jaques hydraulic earth augers.

The dual-purpose Jaques tools are used principally in drilling pole holes for telephone and telegraph and for transmission and distribution in the electrical industry. An optional Jaques accessory that sets poles when holes are drilled is readily attachable to the machines. The hole diggers are also in wide use by state highway departments, utility and oil companies, and general construction.

Five different models of the self-contained, completely hydraulic hole



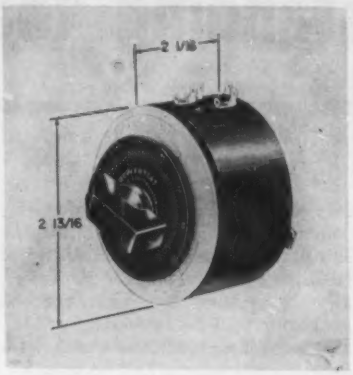
diggers can be quickly mounted on standard trucks or jeeps, and speedily drill holes 9 to 72 inches in diameter and up to 25 feet deep, in any kind of soil or rock, under proper auspices. They operate efficiently from any position up to a 45-degree angle, from either side of a truck.

Write U-914 on reply card, page 21.

Variable transformer boosts rating—not size

POWERSTAT variable transformers of the new 10B series from Superior Electric Co., Dept. 10B, Bristol, Conn., are now available for those variable a-c voltage applications having relatively low wattage requirements. Single units have a depth behind panel of only 2-1/16 inches. They operate from a 120-volt, 60-cycle, 1-phase input with an output of either 0-132 or 0-120 volts, 1.75 amperes. Input can be 50/60 cycles when connected for an output of 0-120 volts.

With a constant-impedance load and connected for a 0-120 volt output, the allowable current at maximum output voltage is 2.5 amperes. Two- and three-gang assemblies are also available for increased ratings and 3-phase operation. A new brush design with large metal-to-carbon



bonded area increases efficiency by reducing resistance.

Metal backing reduces danger of brush breakage under shock and wide design stabilizes brush on the rhodium plated commutator. Brushes are easily replaced without tools.

Write U-915 on reply card, page 21.

Transformers feature increased cable capacity

TWO IMPROVED 600-volt, buytl-molded current transformers with significantly increased cable capacity, color-coded nameplates for ready identification of current ratings and a new, versatile mounting arrangement have been announced by the General Electric Co., Schenectady 5, N. Y.

In addition, accuracy has been increased in one of the new types.

The transformers—for use with watthour meters on indoor or outdoor applications—are the latest versions of the Types JCA-0 and JKP-0.

In keeping with modern utility service requirements, the JCA-0 and

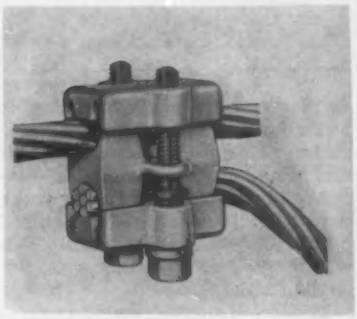
JKP-0 have been redesigned with a larger, round cable window. The new opening accommodates a larger single cable or more smaller ones without sacrificing the over-all compact size of the earlier design.

Improved mounting ease and flexibility has been achieved by the use of stainless steel bases attached by four screws positioned on a 1½ inch square. This arrangement permits turning both types 90 degrees relative to their bases or mounting brackets.

Write U-916 on reply card, page 21.

Two-bolt clamp features large contact area

A NEW UNIVERSAL all-aluminum 2-bolt clamp is now available from Jasper Blackburn Corp., 1525 Woodson Rd., St. Louis 14, Mo., and has several outstanding features. These clamps are engineered with exceptionally large contact area and thick massive spacers which give conductor



protection and high conductivity. The rainshield design prevents washing away of the inhibitor.

Made of non-copper-bearing alloy with anodized aluminum hardware, this massive clamp may be used on copper or aluminum conductors.

Write U-917 on reply card, page 21.

New connectors simplify service entrance splicing

STANDARD compression tools and the new "Insulink" connectors from Burndy Corp., Richards Ave., Norwalk, Conn., make service entrance splices that are neat, electrically stable, and fully protected against moisture and accidental contact. One man can install these service entrance connectors without tape or a "third hand."

The new pre-insulated connector is designed to save time and trouble in splicing copper and aluminum cables ranging from #10 str through 1/10 copper or aluminum and from #6 through #2 ACSR.

Tests demonstrate that the connections are moisture-proof and that they equal or exceed the cable insulation in di-electric strength. They are free from corrosion, and they retain a stable relative conductivity well over 100%, even after 114 heat cycles.

Write U-918 on reply card, page 21.

Understanding the Code

By Walter R. Stone

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

◆ IN CONTRAST to the permissible but obsolete wiring methods discussed in the last issue of this magazine, we will begin our discussion in this issue with one of the newest wiring methods recognized by the Code--Type MI cable. This wiring method is covered by Article 330.

Mineral insulated metal-sheathed cable has not yet come into the wide acceptance which it deserves, but it is gaining in popularity. Some reluctance to use it may have resulted, perhaps, from unfamiliarity with installation methods by journeymen and from a similar unfamiliarity with the ordering of fittings by contractors. However, any reluctance for such reasons probably will be overcome gradually as it has been overcome with other new systems and methods.

Safe wiring method

Type MI cable is one of the safest wiring methods so far devised. The inorganic mineral insulation is ageless, so that once it is properly installed there will be no deterioration of its insulating qualities as long as the metal sheath, terminal fittings, and seals remain intact. The recent development of terminal fittings suitable for use in Class I, Division 1, locations were recognized in the Code by Interim Amendment No. 109, effective as of July 18, 1958. Therefore, when used with these fittings which are listed as safe in such locations, Type MI cable can be used in Class I, Division 1, locations as well as in any of the other hazardous locations defined in Article 500.

Section 3302 lists the permitted uses for MI cable which include every use conceivable, including underground runs for any condition ". . . not having a deteriorating effect on the metal sheath." This section concludes by saying, "The sheath of mineral insulated-metal sheathed cable exposed to destructive corrosive conditions, such as some types of cinder fill, shall be protected by materials suitable for those conditions." Section 3102-b, however, includes Type MI cable in the list of conductors ". . . not suitable for direct burial in the earth unless of a type specifically approved for the purpose." It then specificially lists only Types USE and UF for direct burial.

We have, then, a problem in the use of Type MI cable for underground runs. (This subject was touched upon in the July issue of this magazine in connection with

Code test questions

1. Type MI cable is a cable in which one or more conductors are insulated with a highly compressed refractory mineral insulation. True or false?

2. In Type MI cable, the conductors and insulation are enclosed in a liquidtight and gastight metalic tube sheathing. True or false?

3. Type MI cable is required by the Code to be securely supported at intervals not exceeding 4½ feet. True or false?

4. All bends in Type MI cable shall be so made that the radius of the curve of the inner edge of the bend shall be not less than 5 times the diameter of the cable. True or false?

5. Type MI cable cannot be installed where exposed to continuous moisture. True or false?

6. Exposed runs of armored cable, when mounted on smooth surfaces, shall be secured:

(a) at intervals not exceeding 18 inches.

(b) within 8 inches of each box or fitting and at 3-foot intervals.

(c) at intervals not exceeding 4½ feet and within 12 inches of each box or fitting except lengths of not over 24 inches at terminals where flexibility is necessary.

Which is correct? a? b? or c?

7. Armored cable, when run in basements:

(a) shall be supported to each joist if run under and across such joists or along running boards or through bored holes.

(b) shall be run only through bored holes in joists.

(c) shall be run only on running boards or through bored holes.

Which is correct? a? b? or c?

8. The connector or clamp by which armored cable is connected to the boxes or cabinets:

(a) shall be of a design that the insulating bushing or its equivalent will be visible for inspection.

(b) shall be so designed that only one cable may be fastened by any one connector.

(c) shall have not less than 5 SAE threads.

Which is correct? a? b? or c?

9. Armored cable shall not be used:

(a) In Class I, Division 1, locations but may be used in Class I, Division 2, locations.

(b) in Class I locations but may be used in Class II locations.

(c) in any hazardous locations.

Which is correct? a? b? or c?

10. Armored cable:

(a) may be used in storage-battery rooms.

(b) shall not be used in storage-battery rooms.

(c) shall not be used in storage-battery rooms unless it is Type ACL.

Which is correct a? b? or c?

Correct answers will be found at end of article on page 135.

our discussion of conductors. But I feel that for the sake of clarity, I must repeat this much here.) By a strict interpretation of the Code, it could be ruled that Type MI cable must be pulled in ducts or conduit for underground runs. In my opinion, however, and I believe in the opinion also of most inspection authorities, Type MI cable would be safe for direct burial use *if properly coated with asphalt base paint or tar*. Extra mechanical protection could be provided by creosoted planks or short lengths of raceway where subject to severe mechanical injury.

It is very important to provide this protective coating of asphalt base paint, tar, or other suitable coating when MI cable is to be buried directly in the earth. Some soils, of course, would have no adverse effect upon the metal sheath. But the difficulty of determining this in many cases could be greater than the difficulty of painting the cable sheath. Besides, soil conditions change; and, especially in poulous areas, fills are often made with acid soils trucked in from other areas causing an acid condition where none originally existed.

Moisture must be kept out

As mentioned above, MI cable is a very safe wiring method, and the insulation itself will not deterioate with age. But if the metal sheath corrodes and is eaten away, the insulation will rapidly absorb moisture and develop faults. The cable must then be replaced. The absorbency of the insulation requires immediate sealing of the terminals as well as the end of the unused roll of cable after cutting.

Section 3307 states, "At all points where mineral-insulated metal sheathed cable terminates an approved seal shall be provided immediately after stripping to prevent entrance of moisture into the mineral insulation and in addition, the conductors extending beyond the sheath shall be insulated with an approved insulating material." In hazardous locations, section 5014-a requires that MI cable be ". . . installed and supported in a manner to avoid tensile stress at the termination fittings."

Section 3308 could cause considerable confusion among electricians. It states, "When Type MI cable is connected to boxes or equipment, the fittings shall be approved for the conditions of service. When *single conductor* Type MI cables enter *metal* boxes *through separate openings* refer to section 3018."

Now, section 3018 refers to Alternating Current Systems in Metal Enclosures, requiring, among other things, that all conductors be within the same enclosure in such a manner as to insure equal current flow in both directions. However, although it does not say so, this section means *ferrous* metal enclosures and *not* to non-ferrous metal enclosures. The part of the section referred to *which is applicable to MI cable* is where the cable enters ferrous metal boxes through different openings in the manner of knob-and-tube wiring. In this case, a slot must be cut in the ferrous metal box between the two cable entrance holes if a current of more than 50 amperes is involved.

Clarification on metal enclosures

The copper sheath, being nonferrous, can enclose a single conductor. In fact, this cable is obtainable and listed by UL in sizes from #16 to #4/0 in single-conductor as well as in sizes from #16 to #10 in up to seven-conductor assemblies. The wording used in section 3308 clearly indicates that section 3018 applies only insofar as the ferrous metal boxes are concerned. Section 3018 itself, of course, should be revised to include the qualifying word *ferrous* to modify the word *metal*.

Like all other metal-enclosed wiring systems and enclosures which are approved for wet locations, MI cable is required to be mounted in such a manner that there is not less than ¼-inch air space between it and the mounting surface. This is required for MI cable by section 3305. Other metal systems and enclosures are similarly covered by later sections in the Code. This air space is required only where *permanent* dampness is encountered and *not* on outside walls where occasional rain causes intermittent dampness.

Type MI cable can withstand severe heat without damage to the insulation. The fittings, however, are limiting factors in regard to temperatures. The table in section 3102 of the Code lists MI cable as suitable for use in both wet and dry locations at a maximum temperature of 85 C with Type O terminal fittings. With special terminal fittings, it is approved for a maximum temperature of 250 C. The UL lists fittings for the cable as safe for use in wet locations at a maximum of 60 C and in dry locations at a maximum of 85 C.

It is necessary and important to test the insulation resistance of a completed installation of MI cable before it is covered to determine whether terminations have been correctly made and whether terminal sealing was correctly done before the insulation had time to become permeated with moisture.

Unlike raceways where conductors are pulled in, MI cable, like all other cable assemblies, cannot have the conductors removed and replaced with larger conductors or replaced for any other reason without replacing the entire cable assembly. It is less flexible than cable assemblies with conductors using organic or thermoplastic insulation. But it is more flexible than a rigid raceway system.

Mineral insulation presents a problem where flexibility is needed. Asbestos-insulated conductors can be flexible, but this insulation is also absorbent and can be used only in dry locations. Fluoride coatings have been formed on conductors which afford insulating qualities up to the melting point of the conductors. Such conductors, when so treated, are flexible, and this coating is non-porous. It can be formed on both copper and aluminum conductors as well as on other metals. This type of insulation is still in the experimental stage, however, and probably will not be available commercially for several years.

In the meantime, some flexibility must be sacrificed if the ageless quality of mineral insulation is to be utilized for general use in all locations. Fortunately, a certain degree of rigidity is an asset except in occasional inaccessible locations where fishing of the conductors is necessary and except where conductors are pulled into raceways. Type MI cable has this desired degree of rigidity, making it suitable for mounting on exposed surfaces as well as for mounting within walls, floors, and ceilings.

Armored cable rules

Another type of cable which is much older and more familiar to most electricians is armored cable. The Code requirements for armored cable are covered in Article 334. The various designating letters in the Code for armored cable are sometimes confusing to electricians who commonly refer to all armored cable as "BX" or "BXL". These two

designating letter groups are actually trade names assigned to cables by a manufacturer for his particular product. The Code and UL listings for armored cable have the following letter group designations for the various types:

Type AC indicates code grade rubber insulation; Type ACT, thermoplastic insulation; Type ACU, latex grade rubber insulation; Type ACH, 75 C heat-resistant rubber insulation; and Type ACV indicates varnished cloth insulation. The suffix "L" following any of these letter groups indicates a lead covering over the insulated conductors. For instance, Type ACTL would indicate armored cable with thermoplastic insulation and a lead covering.

The insulated bushing which is required to be installed at the terminals of all types of armored cable when not lead-covered, are not required to be installed on the lead-covered cable because the lead itself, if allowed to extend beyond the armor as required by the Code, offers protection to the insulation equivalent to that provided by the insulated bushings.

Armored cable has been criticized severely, down through the years, because of high-resistant faults which overcurrent devices have failed to clear before damage, and sometimes fire, has resulted.

The Underwriters' Laboratories, Inc., recognizing the inherent danger of high-resistant faults, has set a maximum limit to the permissible resistance per hundred feet for the various sizes of armored cable. For instance, size #14 cannot have more than 0.75 ohms per hundred feet, and size #4 cannot have more than 0.30 ohms per hundred feet.

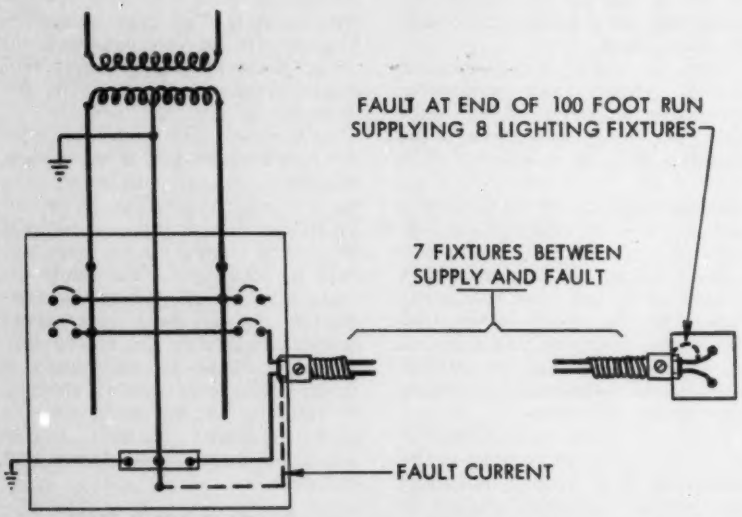
Therefore, all armored cable which is listed by the UL has the armor resistance limited to a safe factor. If the resistance of the armor alone exceeds the allowable resistance, an additional grounding conductor is run along the length, and is made a part of, the cable by the manufacturer in order to keep the total resistance within safe limits.

There is another factor, and a very serious one, which inspectors everywhere are combating. This is the termination resistance factor which is allowed to creep in by electricians during installation. Here is one of the very best examples of why electrical installations should be made only by qualified electricians. It seems such a simple thing, yet it is of the gravest importance, whether locknuts and conductor joints are made up tightly and firmly. Amateur electricians and do-it-yourselfers do not understand the importance of this factor. Unfortunately, not all electricians understand it either. Some electricians whose work is otherwise commendable tend to be careless in this respect.

An example will show clearly why it is important to make all locknuts and terminal connections firm and tight: Assume a circuit of #14 armored cable which has a total length of 100 feet. It supplies, say, 8 hall lights in a combustible ceiling. This circuit is protected by a 15-ampere overcurrent device.

In order for the overcurrent device to work with sufficient rapidity to prevent an arc from igniting the ceiling, not less than 30 amperes must flow through the overcurrent device during a fault. (This is not an exaggeration. Certainly, 15 amperes would not cause the device to operate. And any amount less than 30 amperes would result

(Continued on page 135)



Tight terminal connections are an important factor in armored cable installations. In the accompanying text the author describes a typical lighting installation as diagrammed above. A fault occurring at the end of a 100-foot run would require fault current to travel from overcurrent device through hot wire which is spliced at eight light fixtures, through fault to armor, back through armor which also has terminal connections at eight light fixtures, through service panel enclosure to neutral strip. With about one ohm resistance in the conductor length and armor itself, (#14 AC cable), the wire and armor terminal connections must have a total resistance of less than three ohms in order to safely operate the over-current device before combustible ceiling ignites.

Questions on the Code

(Readers are invited to send in questions which they would like to see discussed in this department.)

Proper positioning of lights in closets

QUESTION: Does section 4115 mean that fixtures in clothes closets can be installed anywhere if mounted on the ceiling, but only over the door if mounted on the wall? Or does it mean that the fixture can be installed only over the door whether mounted on the wall or on the ceiling?

ANSWER: Because of the way this section is worded, it could be interpreted either way. The section states, "Fixtures in clothes closets shall be installed on the ceiling or on the wall above the door. Pendants shall not be installed in clothes closets." As written, the meaning depends upon whether you pause after the word *ceiling* or after the word *wall*.

The whole point, of course, is to prevent a hot lamp from coming into contact with highly combustible material in clothes closets. This material usually is hung from racks and stored upon shelves above the racks. Most inspectors, therefore, insist that the fixture be over the door whether mounted on the ceiling or on the wall. A fixture mounted over the door also gives more light where it is needed with less obstruction from shadows

than one which is mounted over shelving.

It is my opinion that any inspector is justified in rejecting a light over the center of a closet even though shelving is not installed at the time of inspection. As every inspector knows, shelving eventually is installed in most closets, and stored material usually reaches the ceiling and protrudes forward over the front edges of the shelves. On the other hand, nothing can be stored in the door area if access is maintained to the closet. Pendants, or drops, as the section states, are not permitted at all in such closets.

Metal foil insulation Code rule clarified

QUESTION: In wiring an addition to a house, I grounded my switch boxes and outlet boxes to the aluminum foil insulation in the walls as permitted in section 4213 when Romex is used. The man who was installing this insulation caught hold of a water pipe and could not let go. When I knocked him loose with a dry 2x4, I fractured his wrist. Then I insulated my boxes from the aluminum foil as permitted also by the same section and had no more trouble. I recommend that the Code be changed and require all boxes to be insulated.

ANSWER: You have completely misinterpreted this section of the Code, for neither section 4213 nor any other section permits the grounding of metal boxes to metal foil insulation. The section in question requires that such boxes be grounded—repeat—grounded, or else insulated from all contact with metal lath or metal insulation.

Article 250 indicates how required grounding is to be accomplished. Connecting to such foil insulation is not a method of grounding. Rather, it is a preparation for electrocution and burning. If you had used the Romex with the extra grounding conductor and had grounded your boxes to this grounding conductor and then grounded the grounding conductor to the grounded neutral bus at the service, the overcurrent device would have opened the circuit as a result of the fault. And you do, or did, have a fault—somewhere, you had a hot wire in contact with a metal box. This, in turn, energized the connected aluminum foil insulation. The victim completed the circuit, through his body, to the grounded water pipe.

Section 4213 states, "Metal fixtures installed on outlets wired with knob-and-tube work, or nonmetallic sheathed cable, on circuits operating at 150 volts or less to ground, shall be grounded except as follows:

"1. Fixtures mounted on metal or metal lath ceilings or walls may be insulated from their supports and from the metal lath by the use of insulating joints or fixture supports and canopy insulators. See section 4215.

"2. Fixtures not mounted on metal or metal-lath ceilings or walls need not be insulated or grounded. See section 4215."

A fine print note follows this section which states, "Fixtures made of insulating materials, and lampholders with shells of insulating material, are recommended for use with wiring systems that do not afford a ready means for grounding the exposed noncurrent-carrying parts of fixtures and lampholders."

Section 4215, referred to twice above, states, "*Ungrounded* metal lighting fixtures, lampholders and face plates *shall not be installed in contact with conducting surfaces* nor within 8 feet vertically or 5 feet horizontally of laundry tubs, bath tubs, shower baths, plumbing fixtures, steam pipes or other grounded metal work or grounded surfaces. Metal pull chains used at these locations shall be provided with insulating links."

The Code is clear enough in that the metal boxes must be either properly and effectively grounded or else insulated from the metal insulation, but *definitely* not "grounded" to the insulation. Boxes may contact the insulation provided that the boxes are also properly grounded.

It might be of interest to you, also, to know that a person who is gripping an energized object usually can be pulled loose by means of dry clothing, a dry belt, or a dry rope. A dry timber may be used safely to *pry* a person loose, but such a timber results in injury, as a rule, *if used to "knock"* him loose.

Number of outlets on branch circuits

QUESTION: Are there any Code restrictions on the number of openings allowed on a branch circuit?

ANSWER: Yes. Section 7204 states, "Not more than 8 lampholders or receptacles, nor a total load of more than 320 watts, shall be connected to a branch circuit. Motors or appliances of rating more than 320 watts shall have a separate branch circuit."

This section is in Article 720—Circuits And Equipment Operating At Less Than 50 Volts. This Article does not apply to the usual run of 120-volt branch circuits which are covered in Article 210—Branch Circuits. Article 210 does not limit the number of openings to a branch circuit, but it does require a minimum number of circuits based upon the number of square feet involved, and ". . . the total load, in so far as practical, shall be evenly proportioned among the branch circuits according to their capacity."

"The number of circuits shall be not less than that determined from the total computed load and the capacity of circuits to be used, but in every case the number shall be sufficient for the actual load to be served." A good electrician, of course, will add additional circuits for additional outlets where additional loads are likely to be used. Where additional outlets are added for convenience only in having more places to plug in the same load, then the additional outlets will not overload the circuit.

Some local ordinances, however, do limit the number of current-consuming openings which are allowed on various size circuits. The reason for this is because by limiting the number of openings at the time of installation, the circuit wiring is automatically derated to compensate for excessive temperatures in insulated walls and ceilings where conductors cannot safely carry loads which would be normal in other locations. This practice seems to be more prevalent, as might be expected, in hot climates.

The Code requirement for derating conductors in such temperatures is met by the multiplying factors in the tables numbered 1, 1-a, 2, and 2-a. This Code method of solving the problem is more equitable in that it does not penalize those who want extra openings for the sake of convenience only. But this solution is sometimes troublesome to follow because of the need for taking temperatures, and because the temperature of a closed wall cannot be determined while the wall is still open for the placement of wiring. Ordinances which limit the number of openings, therefore, are striving for an easier way to accomplish derating. And, as stated, even the Code does restrict the number of openings allowed on circuits of less than 50 volts.

New series of tables extended to include larger hourly rates

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

NATIONAL ELECTRIC "OVAL FLEX"
ARMORED BUSHED CABLE
WOOD MOUNTED "EXPOSED"

SIZE	HOURS PER "C"	LABOR COST PER FT. INSTALLED AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
14 - 2	5.4	.108	.122	.135	.149	.162	.176	.189	.203	.216	.23	.243
12 - 2	5.4	.108	.122	.135	.149	.162	.176	.189	.203	.216	.23	.243
10 - 2	5.6	.112	.126	.14	.154	.168	.182	.196	.21	.224	.238	.252
14 - 3	5.6	.112	.126	.14	.154	.168	.182	.196	.21	.224	.238	.252
12 - 3	6.0	.12	.135	.15	.165	.18	.195	.21	.225	.24	.255	.27
		MASONRY MOUNTED "EXPOSED"										
14 - 2	6.7	.134	.151	.168	.184	.201	.218	.235	.251	.268	.285	.302
12 - 2	6.7	.134	.151	.168	.184	.201	.218	.235	.251	.268	.285	.302
10 - 2	6.9	.138	.155	.173	.19	.207	.224	.242	.259	.276	.293	.311
14 - 3	6.9	.138	.155	.173	.19	.207	.224	.242	.259	.276	.293	.311
12 - 3	6.9	.138	.155	.173	.19	.207	.224	.242	.259	.276	.293	.311
		MASONRY MOUNTED " TO BE PLASTERED IN"										
14 - 2	6.3	.126	.142	.158	.173	.189	.205	.221	.236	.252	.268	.284
14 - 3	6.3	.126	.142	.158	.173	.189	.205	.221	.236	.252	.268	.284
10 - 2	6.6	.132	.149	.165	.182	.198	.215	.231	.248	.264	.281	.297
14 - 3	6.6	.132	.149	.165	.182	.198	.215	.231	.248	.264	.281	.297
12 - 3	6.6	.132	.149	.165	.182	.198	.215	.231	.248	.264	.281	.297

E-101-B

LABOR: INCLUDES CUTTING, SETTING ANCHORS, INSTALLING DUCT AND CONNECTING TO TERMINUS

9-59

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NATIONAL ELECTRIC PRODUCTS
OVALFLEX "FITTINGS" WOOD MTD.

ITEM NO.	HOURS EACH	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
412	.22	.44	.495	.55	.61	.66	.72	.77	.83	.88	.94	.99
413	.22	.44	.495	.55	.61	.66	.72	.77	.83	.88	.94	.99
24CQ	.27	.54	.61	.68	.74	.81	.88	.95	1.01	1.08	1.15	1.22
26CQ	.27	.54	.61	.68	.74	.81	.88	.95	1.01	1.08	1.15	1.22
2862	.32	.64	.72	.80	.88	.96	1.04	1.12	1.20	1.28	1.36	1.44
2662	.43	.86	.97	1.08	1.18	1.29	1.40	1.51	1.61	1.72	1.83	1.94
2663	.43	.86	.97	1.08	1.18	1.29	1.40	1.51	1.61	1.72	1.83	1.94
417051	.38	.76	.86	.95	1.05	1.14	1.24	1.33	1.43	1.52	1.62	1.71
417251	.38	.76	.86	.95	1.05	1.14	1.24	1.33	1.43	1.52	1.62	1.71
		MASONRY MOUNTED										
412	.27	.54	.61	.68	.74	.81	.88	.95	1.01	1.08	1.15	1.22
413	.27	.54	.61	.68	.74	.81	.88	.95	1.01	1.08	1.15	1.22
24CQ	.38	.76	.86	.95	1.05	1.14	1.24	1.33	1.43	1.52	1.62	1.71
26CQ	.38	.76	.86	.95	1.05	1.14	1.24	1.33	1.43	1.52	1.62	1.71
2862	.43	.86	.97	1.08	1.18	1.29	1.40	1.51	1.61	1.72	1.83	1.94
2662	.49	.98	1.10	1.23	1.35	1.47	1.59	1.72	1.84	1.96	2.08	2.21
2663	.49	.98	1.10	1.23	1.35	1.47	1.59	1.72	1.84	1.96	2.08	2.21
417051	.43	.86	.97	1.08	1.18	1.29	1.40	1.51	1.61	1.72	1.83	1.94
417251	.43	.86	.97	1.08	1.18	1.29	1.40	1.51	1.61	1.72	1.83	1.94

E-102-B

NOTE: 412-413 INCLUDES 1 ANCHOR AND MAKE UP; EXT. BOX COVERS INCLUDES ADDITIONAL RIMS MAKE UP OF BOX. BOXES INCLUDE MOUNTING AND MAKE UP OF TAPS, ETC. DRILLING IN MASONRY BY ELECTRIC DRILL OR HAMMER.

9-59

ARMORED "BXL" CABLE
SURFACE INSTALLATION

NEW WORK

NO. CONDR'S SIZE	HRS. "C"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
2/14	5.3	.106	.119	.133	.146	.159	.172	.186	.199	.212	.225	.239
2/12	5.5	.11	.124	.138	.151	.165	.179	.193	.206	.22	.234	.248
2/10	5.6	.112	.126	.14	.154	.168	.182	.196	.21	.224	.238	.252
2/8	7.1	.142	.16	.178	.195	.213	.231	.249	.266	.284	.302	.32
2/6	8.0	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36
3/14	5.5	.11	.124	.138	.151	.165	.179	.193	.206	.22	.234	.248
3/12	5.8	.116	.131	.145	.16	.174	.189	.203	.218	.232	.247	.261
3/10	6.7	.134	.151	.168	.184	.201	.218	.235	.251	.268	.285	.302
3/8	8.5	.17	.191	.213	.234	.255	.276	.298	.319	.34	.361	.383
3/6	9.4	.188	.212	.235	.259	.282	.306	.329	.353	.376	.40	.423
3/4	11.2	.224	.252	.28	.308	.336	.364	.392	.42	.448	.476	.50
		EMBEDDED IN CONCRETE										
2/14	2.8	.056	.063	.07	.077	.084	.091	.098	.105	.112	.119	.126
2/12	2.9	.058	.065	.073	.08	.087	.094	.102	.109	.116	.123	.131
2/10	3.0	.06	.068	.075	.083	.09	.098	.105	.113	.12	.128	.135
2/8	3.7	.074	.083	.093	.102	.111	.12	.13	.139	.148	.157	.167
2/6	4.2	.084	.095	.105	.116	.126	.137	.147	.158	.168	.179	.189
3/14	3.0	.06	.068	.075	.083	.09	.098	.105	.113	.12	.128	.135
3/12	3.1	.062	.07	.078	.085	.093	.101	.109	.116	.124	.132	.14
3/10	3.4	.068	.077	.085	.094	.102	.111	.119	.128	.136	.145	.153
3/8	4.5	.09	.101	.113	.124	.135	.146	.158	.169	.18	.191	.203
3/6	4.9	.098	.110	.123	.135	.147	.159	.172	.184	.196	.208	.221
3/4	6.0	.12	.135	.15	.165	.18	.195	.21	.225	.24	.255	.27

E-102-B

LABOR: INCLUDES PREPARATION, INSTALLING ANCHORS (WITH POWER), INSTALLING CABLE AND INSTALLING STRAPS. (NO CHANNELLING OR DRILLING PASSAGE HOLES THROUGH WALLS).

9-59

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Know the law

by Arthur L. H. Street

Enforcing lien against improved property

◆ ELECTRICAL contractors in Alabama will be especially interested in the decision rendered by the Supreme Court of that state in the case of Knox v. Jones, 108 So. 2d 369. In that case subcontractors on a dwelling house construction job had no contract with the owners, being merely employees of the general contractor.

The Alabama lien law, like that of many other states, provides for the enforcement of a lien against improved property by a contractor or subcontractor by giving required notice. The law also contains this provision: If the materialman before furnishing any material notifies the owner or his agent, in writing, that material will be furnished by him to the contractor for use in construction on the owner's land, the materialman shall have a lien for the full price of the materials specified in the notice, regardless of whether the amount of the claim for such materials exceeds the unpaid balance due by the owner to the contractor, unless the owner on receiving such notice, notifies the materialman before any material is used that he will not be responsible for the price. The statute specified that the notice, worded as follows, given by the materialman will be sufficient to establish his rights unless the owner gives the counter notice above provided for by the statute:

"To ————————, owner or proprietor:

Take notice, that the undersigned is about to furnish————, your contractor or subcontractor, certain material for the construction, or for the repairing, altering, or beautifying of a building or buildings, or improvement or improvements, on the following described property:

———————————————

———————————————

and there will become due to the undersigned on account thereof the price of said material, for the payment of which the undersigned will claim a lien."

Because in this case the materialman did not give the statutory notice before furnishing materials, the court decided that a lien extended only to a pro rata share of the unpaid balance due by the owner to the general contractor, after deducting the amount paid by the owner to a third person for completing construction on a cost-plus basis after the general contractor defaulted in performance.

Insurance settlement for injured contractor

◆ WHEN AN ELECTRICAL contractor is temporarily or permanently injured by accident or negligence of another, the extent to which he may be able to collect from an accident insurance company or from the negligent person will usually depend upon whether the contractor is self-employed or not. Obviously, a contractor who merely manages his business and is not a self-employed electrician may not be as seriously disqualified to carry on by an accident which might temporarily or permanently disable the latter.

A case in point was lately decided by the New Jersey Superior Court, Appellate Division, Ditmar v. Continental Casualty Co., 143 Atl. 2d 249.

Contractor Ditmar, 48 years old, had been an electrician for 32 years—ever since he quit school in the eighth grade to work for his father, an electrical contractor. He succeeded to the business when his father died. Much of the work was done by his employees, but he often worked with them as he supervised jobs.

While so working he accidentally burned his right hand and arm in a gasoline fire, resulting in their being rendered completely useless.

He carried accident insurance, but the insurance company rejected his claim, as to the extent of benefits to which he was entitled under the wording of the policy. In the litigation that ensued, the Superior Court decided that he was not entitled to permanent *total* disability benefits after he was able to resume supervision of his business although no longer able to perform physical labor. The court said:

"Plaintiff's occupation since the death of his father in 1950 has been that of an electrical conduty connected with that occupation was unquestionably that of tractor. Although an important working electrician, there were other important duties—obtaining jobs, directing his employee or employees, obtaining supplies and equipment, billing and collecting for his work, and, when possible, supervising work on the job. Plaintiff is still able to do these in large part, and such disability as he has would therefore be covered under the disability provision."

Substitutions require architect's ruling

◆ IF AN ELECTRICAL subcontractor's agreement with a general contractor calls for approval or disapproval of the work by a certain architect, does the general contractor have a right to tear out the electrical installations without disapproval of the same by the named architect?

A negative answer to this question seems to be called for by the decision of the Georgia Court of Appeals in the case of Huggins v. Atlanta Tile and Marble Co., 106 S.E. 2d 191, although that case involved installation of tile rather than electrical work.

The subcontract called for supervision by the "architect," a Mr. Bradbury. The tile was torn out with the approval of his associate. The Court of Appeals decided that the general contractors could not hold defendant tile company liable for the cost of relaying. On the contrary, the company was entitled to payment for its work. The court said:

"An architect is selected and agreed upon to exercise his personal skill, discretion, and judgment, and his duty to exercise such skill, judgment, and discretion cannot be delegated. * * * The per-

(Continued on page 135)

News of the industry

edited for Southern readers

Browder elected IES president

JOE B. BROWDER, Atlanta utility executive, has been elected president of the Illuminating Engineering Society, professional organization of U. S. and Canadian lighting engineers, it was announced here today by A. Dexter Hinckley, managing director.

Mr. Browder, who is assistant to the vice-president in charge of sales and sales manager for the Georgia Power Co., is presently completing a two-year term as vice-president of the society.

Other top national officers elected by mail ballot of the membership include James R. Chambers, sales manager, lighting products division, Appleton Electric Manufacturing Co., Chicago, vice-president for a two-year term and Charles W. McCormick, commercial sales manager, Connecticut Light and Power Co., Berlin, Conn., general secretary. G. Franklin Dean, supervising engineer of lighting service, Toronto Hydro-Electric System, Toronto, Ont., Canada, was re-elected treasurer. Each will serve for one year.

Richard G. Slauer, manager of marketing services, fixture division, Sylvania Electric Products, Inc., Wheeling, W. Va., continues as the society's vice-president for the second year of his two-year term.

J. B. Browder J. R. Chambers R. G. Slauer G. F. Dean

Amarillo, Texas plans Medallion Home parade

SOUTHWESTERN Public Service Company with system headquarters in Amarillo, Texas, will sponsor a gigantic Parade of Medallion Homes in connection with National Home Week September 13-20.

E. G. Weber, the power company's advertising manager, said 100 Medallion homes in the system's major cities from Carlsbad, N. M., to Guymon, Okla., will be on display.

Weber said the Medallion program is timed to tie in with a 30-page "Living Better Electrically" spectacular which *Life* Magazine will carry in its September 14th issue. The big spread in the magazine is sponsored by the National Electric Living Program and 12 major manufacturers.

"This is a 'crash program' on our part," said Weber. "We had intended to wait until 1960 to hold the system-wide Parade, but we couldn't afford to pass up that *Life* spectacular. We also figure to save money by selling in one concentrated program."

Weber said that cooperation of area home builders and distributors in the Medallion promotion has been excellent. The utility company in the first six months of 1959 has signed up more homes than for the entire year of 1958, according to Weber. He said that the 200 homes built during the first six months (186 Bronze and 14 Gold Medallions), plus the 100 being completed for the September Parade, and others under construction, are more than enough needed for SWPS's 1959 goal of 355 Medallion homes. The Medallion program was launched by the company at the beginning of 1958; 172 Medallion homes were built that year.

The big September promotion will be pushed in all advertising media—television, radio, newspaper, and billboards.

Distributors in the area have pitched in to provide a large slate of prizes to be given during the Medallion Parade. "We are receiving tremendous cooperation from the distributors," Weber said.

The premiums include a daily prize of a small home appliance to be given in each of the participating cities; an area prize of an all-electric kitchen and the wiring of a home for Housepower; at the end of the Parade in each of the five divisions of the system at least four major appliances will be awarded.

Southwestern Public Service company will provide an electric yard light for each of the Medallion homes.

The promotion is under the direction of J. B. Austin, sales manager, and Weber.

J. B. Austin E. G. Weber

Construction contracts set all-time record

CONSTRUCTION contracts in the first half of 1959 set a new all-time record for the period, with large increases in residential and non-residential building categories offsetting declines in heavy engineering, according to F. W. Dodge Corp.

In a midyear review published in the Dodge monthly bulletin, *Building Business*, the Corporation's economists said that the most significant feature of the period was the strength showed by the private sector of the industry, which rose sharply despite a drop in government projects.

Noting that the Dodge seasonally adjusted index of contracts had risen to very high peaks in the middle of 1958, then declined in the winter, and is now rising again, the report said:

"The peak in the middle of 1958 was very largely the result of government stimulation of housing and highway activity as an anti-recession measure. Perhaps the best feature of the first half of 1959 is that contracts have risen to almost the same level without the benefit of special government stimulants."

Power Distribution Conference program

THE TENTATIVE program for the next Texas Power Distribution Conference to be held October 26, 27, and 28, 1959, has been released. The conference is sponsored annually by the Electrical Engineering Department of the University of Texas, Austin,

Texas, under the direction of Prof. B. M. Gafford.

Speakers for the first day of the conference will cover the topics "Lighting of Street and Outdoor Industrial Areas," "Grounding of Industrial Delta Systems," "Latest Developments in Pole and Cross-Arm Treatment," "Design of Wooden Distribution Structures," and "Selection and Installation of 15 kv Insulated Cable."

The second day of the meeting, speakers will cover the subjects "Lightning Protection on Distribution Circuits," "New Developments in Network Protectors," "Design Evaluation of Underground Systems," and "Fundamentals of Primary and Secondary Circuit Design."

Subjects for the morning program of the final day will be "Service Qualities Required in Residential Areas" and "Serving Single-Phase and Three-Phase Residential Motors." The last afternoon of the conference a panel discussion will be held on the subject of voltage regulation by capacitors and/or regulators.

NECA convention to be held in Miami

THE LARGEST single assembly of electrical men in the United States is expected to gather at Miami Beach, Fla., the week of November 9 for the 58th Anniversary Convention of the National Electrical Contractors Association (NECA) and the Fifth National Electrical Exposition.

More than 3,000 are expected, on the basis of advance registrations for the convention, to attend the convention sessions and the exposition. The convention sessions will deal with problems of improving the electrical contracting industry's capacity to handle the growing volume of complex electrical systems for home, office, store, factory, public buildings, and facilities. The exposition will feature the latest in electrical materials, equipment, apparatus, and tools displayed by more than 160 manufacturers in 235 booths in the new exposition hall of the Hotel Fontainebleau. The convention will be held in the auditorium of the Hotel Fontainebleau.

Theme for this convention will be "Shaping Our Future." Around this, Executive Vice-President Paul M. Geary of NECA has built a four-day business session starting on Nov. 9th and concluding on Nov. 12th.

"The continuing rapid increase in electrical use, requiring more complex installations and more of them, poses real problems for the electrical contracting industry," Mr. Geary said. "This convention will be concerned primarily with reviewing suggestions and programs designed to meet this need for electrical contracting services and to adjust the industry to changing conditions."

Tenn. utilities plan power use meeting

THE POWER USE Section of the Tennessee Valley Public Power Association will hold its annual meeting September 21 and 22 at the Patten Hotel in Chattanooga.

The theme of this year's meeting is load-building.

Nine speakers, each expert in his field, will appear on the main program. In addition, there will be three special-interest forums on residential, commercial, and farm uses of electricity.

The social activities include a dance, banquet, and hospitality hour.

Northeast Texas Chapter of NECA names officers

AT THE ANNUAL MEETING of the Northeast Texas Chapter of the National Electrical Contractors Association held recently, Jim L. McClure, of McClure Electric Co., was elected chapter president.

Other officers named were Vice-President Herbert A. Gold, of Gotham Electric Co., Treasurer Jettie Kirk of Kirk Electric Service, and Directors: John D. Keys, Ray G. Smith, E. J. Telkamp, and Rob Roy, immediate past president.

William F. Abright is the chapter's member on the National Association's Board of Governors.

Wire company makes new appointments

CHANGES in the organization of Southern Electrical Co., Chattanooga, Tenn., an operation of the Metals Division of Olin Mathieson Chemical Corp., were announced today by Milton L. Herzog, vice-president and general manager of operations, Metals Division.

H. D. Seaton Sr., formerly general manager of Southern Electrical Company, has been appointed consultant to N. H. Collisson, vice-president and general manager, Metals Division. In his new capacity, he will assist and advise Metals Division management on southern electrical manufacturing and sales activities.

Mr. Herzog also announced the appointment of Charlton W. Smith as plant manager with responsibility for the operation of the Chattanooga plant where Southern Electrical products are manufactured. He will report to Harry E. Gude, vice-president for manufacturing, Metals Division.

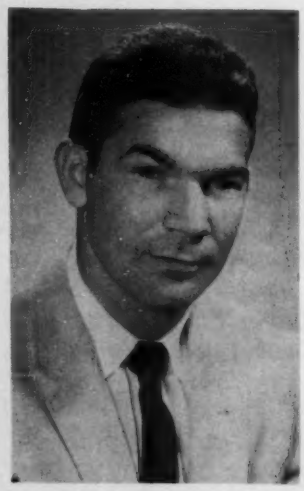
H. H. Bullen was named director of electrical conductor sales, reporting to Derek Richardson, vice-president of aluminum sales, Metals Division.

Alcoa line added to Rome Cable Corp.

ALUMINUM Company of America today announced that responsibility for sales of all Alcoa aluminum conduit now is being transferred to Rome Cable Corp., which recently became an Alcoa subsidiary.

Addition of the Alcoa line to that

Electrical South expands staff in Southwest



BOB KING, an experienced journalist, has joined the staff of ELECTRICAL SOUTH, and will serve as its southwestern editor with headquarters in Dallas.

Following his graduation from Kansas State University with a degree in Industrial Journalism, Mr. King was employed for a time as a reporter for Kansas and Arkansas newspapers.

For a number of years he engaged in public relations work for Southwestern organizations. More recently he has served as senior editor of Southwest Implement Journal, a publication recently acquired by W. R. C. Smith Publishing Co., which publishes ELECTRICAL SOUTH.

of the Rome, N. Y., firm will make available to the electrical industry a full line of aluminum and copper conductors and accessories and aluminum and steel conduit from a single nationally known supplier.

Dixon Lewis, Alcoa's assistant manager of electrical conductor sales since 1953, has been named product manager of conduit for Rome Cable, according to Glenn Rolston, vice-president and manager of marketing for Rome. Mr. Lewis will be on Mr. Rolston's staff, but will continue to be based at Alcoa's home offices in Pittsburgh.

T. M. Rogers retires

THURMAN M. ROGERS, general manager of the Easley, South Carolina Water and Light Plant for 36 years, has retired. He had been with the utilities company for more than 40 years and though he retired once, he returned several years ago to become general manager for the second time. A successor has not been announced.

William W. Ege

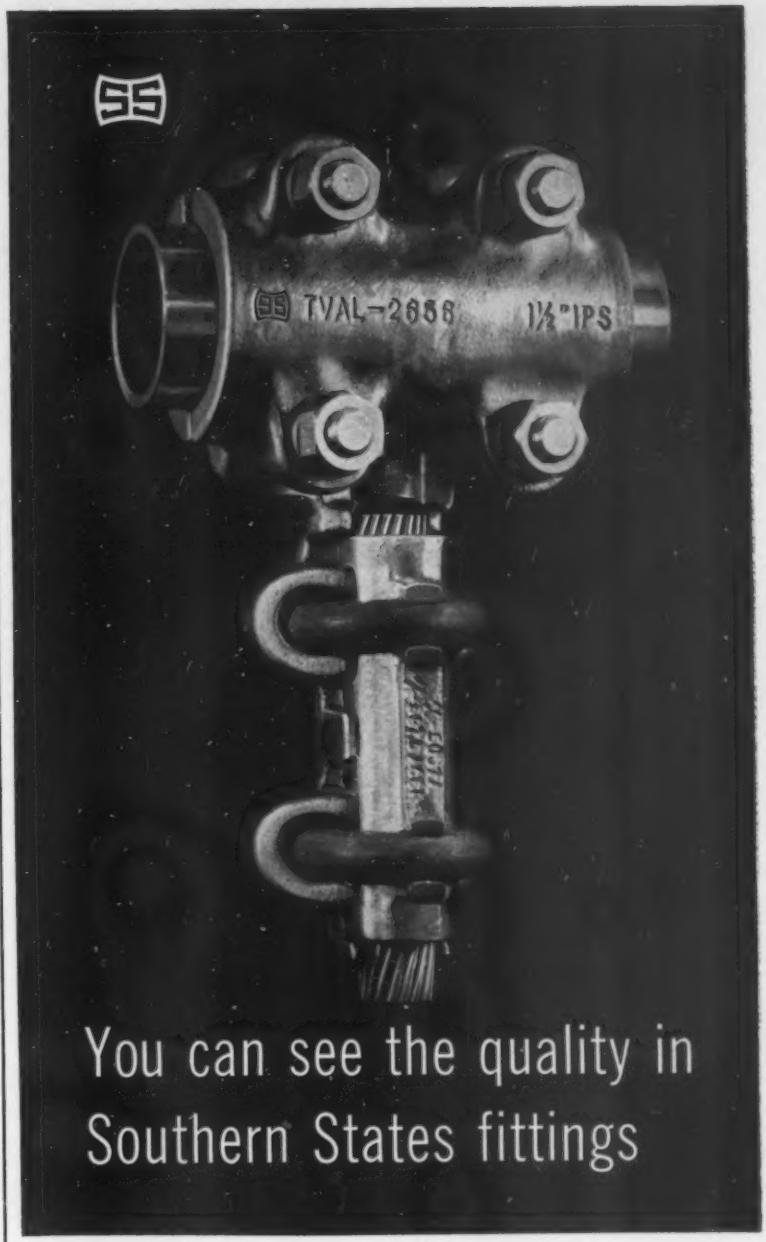
WILLIAM W. EGE, prominent businessman and steel company executive, died recently at his home in Mt. Lebanon, Pa. He was 59 years of age.

Widely known in the electrical power, railroad, and communication industries, Mr. Ege was vice-president in charge of Copperweld Steel Company's wire and cable division and a director of the company. In 1943, Mr. Ege moved to Pittsburgh to take charge of wire and cable sales for the entire country. Prior to that, he was western district manager of sales with headquarters in Chicago. He was associated with the company for 33 years.

Men moving up in the industry

THOMAS F. MCCARTHY has been appointed vice-president in charge of market development for the Edwards

T. F. McCarthy



Engineers with an eye for good design know at a glance that Southern States fittings are top quality throughout. Made in our own plant from carefully chosen bronze or aluminum alloys, they provide maximum mechanical and electrical characteristics. Recessed boltheads permit one-wrench assembly. Never underestimate the importance of a good connection!

SS SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

Co. In his new assignment, Mr. McCarthy will guide the company's efforts to develop new markets for the protection, signaling, and communication products of its design and manufacture.

* * *

THOMAS HOLLINGSWORTH has been appointed general sales manager of Hubbard and Co., pole line hardware and electrical apparatus manufac-

T. Hollingsworth

turer. He will operate out of their Chicago executive offices.

Mr. Hollingsworth was most recently director of marketing for Electrical Engineers Equipment Co., a Hubbard subsidiary.

* * *

H. R. ROWE has been named manager of capacitor sales and service by Line Material Industries. His appoint-

H. R. Rowe

ment to this newly created position was announced by Nicholas K. Delaney, product manager - oil switchgear and capacitors.

Rowe was formerly a field engineer at Pine Bluff, Ark., for L-M's south central region. His new position will take him to the company's central plant at South Milwaukee, Wis.

* * *

D. L. HARPER, Peninsular district manager of the Graybar Electric Co., Inc., has announced the appointment of A. P. Torres as manager at Miami. Before his recent promotion, Mr. Torres was manager, inside construction sales at Tampa.

* * *

ROBERT H. HIRTE has been appointed general sales manager of the All-Brite Lighting Division, Curtis-All-Brite Lighting, Inc., South San

R. H. Hirte

Francisco, Calif., it was announced by Chas. D. Buchanan, president. In his new capacity, Hirte will succeed Buchanan, who formerly directed All-Brite sales and is now in charge of national sales for Curtis-AllBrite.

* * *

DOUGLAS J. O'CONNOR has been named branch manager of the Okonite Company's newly-created Tulsa, Okla., office. Temporarily his address is P. O. Box 163, Tulsa.

Mr. O'Connor was associated with the electrical wire and cable manufacturer's Atlanta, Ga., office for two years as a sales engineer.

* * *

UPON RECOMMENDATION of the President Merwin Brandon, the board of trustees of Underwriters' Laboratories, Inc., promoted H. B. Whitaker to the position of vice-president and chief electrical engineer with his headquarters in New York. He will be the head of the three electrical de-

Dates Ahead

Public Utilities Association of the Virginias, Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., Sept. 17-20, 1959.

Edison Electric Institute, Transmission and Distribution Committee Meeting, Rice Hotel, Houston, Texas, Oct. 1-2, 1959.

Missouri Valley Electric Assn., Sales and Rural Conference, President Hotel, Kansas City, Mo., Oct. 7-9, 1959.

Florida Association of Electrical Contractors, Convention and 7th Annual Trade Show, The Robert Meyer Hotel, Jacksonville, Fla., Oct. 7-10, 1959.

International Association of Electrical Inspectors, Southern Section, 31st Annual Meeting, Heidelberg Hotel, Jackson, Miss., Oct. 12-14, 1959.

American Institute of Electrical Engineers, Fall General Meeting, Chicago, Ill., Oct. 12-16, 1959.

Southeastern Electrical Exchange, Engineering and Operation Section Conference, Biltmore Hotel, Atlanta, Ga., Oct., 15-16, 1959.

Power Distribution Conference, Dept. of Electrical Engineering, University of Texas, Austin, Texas, Oct. 26-28, 1959.

National Electrical Contractors Association, Annual Convention and Electrical Exposition, Hotel Fontainebleau, Miami, Fla., Nov. 9-12, 1959.

Southeastern Electric Exchange, Sales Conference, Roosevelt Hotel, New Orleans, La., Nov. 16-18, 1959.

Missouri Valley Electric Association, Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 8-9, 1960.

Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel and Club, Boca Raton, Fla., March 21-23, 1960.

Southeastern Electric Exchange, Engineering and Operation Section Conference, Roosevelt Hotel, New Orleans, La., Apr. 7-8, 1960.

Missouri Valley Electric Association, Engineering Conference, President Hotel and Municipal Auditorium, Kansas City, Mo., Apr. 20-22, 1960.

partments as well as the contact man for such organizations as ASA, AIEE, IAEI, NEMA, etc.

• • •

JAMES F. "Tex" Wueste of Bethesda, Md., has been named manager for the Washington region of the Crouse-Hinds Co., Syracuse, N.Y.

J. F. Wueste

Wueste, a native of Texas, has been with Crouse-Hinds since 1939, and has been located in Washington, D.C. since 1940, where he has served the company as a product engineer.

• • •

LAWRENCE M. LYONS has been named production manager of the utility-industrial division of Burndy Corp., electrical connector manufacturer with headquarters at Norwalk, Conn.

The appointment was announced by Eric E. DeMarsh, vice-president and

L. M. Lyons

general manager of the U-I division, which serves electric utilities and electrical construction. Mr. Lyons will supervise all manufacturing at the division's plants in New York City and Connecticut.

• • •

APPOINTMENT of George A. Saar as assistant to J. L. Singleton, vice-president of the Industries Group, has been announced by Allis-Chalmers.

For the last four years, Saar had been manager of the electrical department at Allis-Chalmers Norwood

SHERMAN TERMINAL LUGS AND CRIMPING TOOLS

SPEED INSTALLATION – REDUCE COSTS!

INDENTED CRIMP FOR GREATER RESISTANCE TO PULL-OUT

VOID FREE CONNECTION

MONEY SAVER
SAVE UP TO 15% WITH SHERMAN

SHERMAN UNI-CRIMP LUG

SHERMAN "ST" LUG

SHERMAN HAND CRIMPING TOOLS
Portable or bench mounted for fast, easy installation of money-saving Sherman terminal lugs.

ELECTRICAL FITTINGS

GF-138 Solderless Ground Fittings.

GF-23 Conduit Solderless swivel-type Ground Fittings.

SL Approved Type Ground Clamps. Pure Copper — Handles wire up to No. 8 AWG.

FOR WIRE and CABLE

GF-18, 19 & 20 Cast Clamps. Cast Copper Alloy with non-ferrous screw.

"Band-Rod" GF-16 & 17 Ground Clamps. Heavy Bronze one-piece construction.

SS Solderless Type #14 thru #1000 MCM-AWG.

the line of Reliable quality!

SO Solderless Type #14 thru 500 MCM-AWG.

You'll do better with SHERMAN -63 years best!

RETURN THE COUPON TODAY!

H. B. SHERMAN MFG. CO.
Battle Creek, Michigan

Show me how I can save up to 15% with your –
☐ LUGS ☐ CRIMPING TOOL ☐ BOTH

Name_____
Firm_____
Address_____
City_____ State_____

H. B. SHERMAN MANUFACTURING CO., BATTLE CREEK, MICHIGAN

(Ohio) Works. Prior to that he had been works comptroller at Norwood for six years.

* * *

ALLAN W. LARSON has been appointed sales manager for The Bryant Electric Co., it was announced recently by Clyde H. Wood, marketing manager. Mr. Larson will be responsible for Bryant's national selling organization.

A. L. Larson

A-C "ControlLiner" on tour of country

A SPECIALLY-DESIGNED tractor-trailer unit, the "ControlLiner," showing Allis-Chalmers complete line of low and high voltage motor controls, is now "on tour." The mobile exhibit is scheduled to visit about 100 major cities throughout the country.

Accompanying the trailer are Allis-Chalmers product department application engineers and district office representatives who will present to management and operating personnel of steel mills, automobile factories, paper mills, rubber companies, chemical plants, machine shops, salt companies, cereal producers, glass manufacturers, and others, the important equipment and technological advances Allis-Chalmers now offers for them.

They will explain to visitors the features and components of the products shown, discuss various improvements in application of the products and offer advice on any specific customer problem.

Manufacturers appoint new representatives

JASPER BLACKBURN Corp., St. Louis, Mo., manufacturer of electrical fittings, which moved to its modern 100,000 sq. ft. plant in 1957, announces the purchase of ten additional acres for anticipated future expansion. With this acquisition, Blackburn now has a total of twenty acres well located on Woodson Road in suburban St. Louis.

* * *

E. JERRY WHITLOW has been appointed general sales manager of Columbia Electric Co., Inc., Dallas, Texas, according to Walter A. Toly, president. Columbia Electric Co., Inc., is a subsidiary of Columbia Electric & Manufacturing Co., Spokane, Wash.

Mr. Whitlow had been associated with McClure Electrical Co., electrical contracting firm of Dallas, for almost 14 years, and was serving as vice-president of the company when he resigned to accept the position with Columbia.

* * *

JAMES R. HILLIN has been appointed sales engineer in the field sales organization of White-Rodgers Co., according to a recent announcement from the firm.

To be stationed in the Atlanta, Ga., sales office, Hillin will handle sales and application of the entire line of White-Rodgers heating, refrigeration, and air conditioning controls for Georgia, Florida, North Carolina, and South Carolina.

* * *

APPOINTMENT of Hugh S. Sells as manager of the Boston district and of Albert R. Knauss as Knoxville district manager has been announced by Allis-Chalmers Industries Group.

Sells formerly was manager at Knoxville and Knauss was manager at Boston.

* * *

RICHARD (DICK) M. ONG has been appointed as a new electrical sales representative for The Paine Company of Addison, Ill. Paine manufactures a complete line of quality hanging and fastening devices.

R. M. Ong

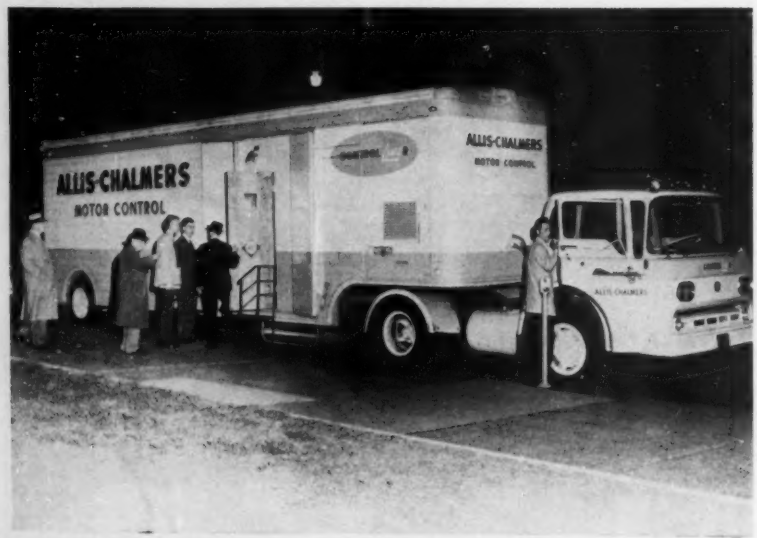
Mr. Ong, operating from out of his New Orleans office, will cover the marketing areas of Louisiana and Southern Mississippi.

* * *

SUN-TRON CORP., Chicago, maker of electric heating equipment, has announced the appointment of Dean Griffith Co., Birmingham, Ala., to represent their company in Mississippi, Alabama, and West Florida.

* * *

ALFRED H. STONE, electrical manufacturers representative, 1400 N. W. 179th Ter., Miami, Fla., has been appointed Florida representative for Chase and Sons, North Quincy, Mass.,



Visitors climb aboard the "ControlLiner" for a night tour at one of its frequent stops as it tours the country. The tractor-trailer unit contains the complete Allis-Chalmers line of low and high voltage motor controls and is scheduled to visit about 100 major cities.

manufacturers of a complete line of friction and plastic tapes. At the same time, it was also announced that Mr. Stone will also take over Florida representation for Bridgeport Fittings, Bridgeport, Conn. Bridgeport manufactures a complete line of malleable iron fittings.

* * *

HENRI, HURST, & McDONALD has been named as advertising agency for the Benjamin Electric Manufacturing Co. Benjamin Electric (industrial and commercial lighting fixtures, audible signal equipment, and chalk boards) is a division of Thomas Industries, Inc., also handled by Henri, Hurst, & McDonald.

* * *

ELECTRO LIGHTING Corp., Chicago, has announced the appointment of Thomas J. Barr, Traweek-Heely & Associates, San Antonio, Texas, as district manager for their entire line

T. J. Barr

of fluorescent, incandescent, and floodlighting equipment for industry and commerce in the San Antonio, Austin, Corpus Christi, and Valley area of south-central Texas.

* * *

HUSKY PRODUCTS, Inc., Cincinnati, Ohio, has appointed 13 new manufacturer's agents in the South and Southwest. The appointments are as follows: Alabama—Charles W. Ashby Co., Birmingham; Florida—George Weeks and Associates, Jacksonville; Georgia—Osgood and Associates, Inc., Atlanta; Kentucky (West)—Engineering Products, Indianapolis, Ind.; North Carolina—E. T. Green, Greensboro; Kentucky (East)—Phister Engineering Co., Cincinnati, Ohio; Oklahoma—Nelson Electric Supply Co., Tulsa; Delaware, Virginia, District of Columbia, Maryland—Rumsey Electric Co., Philadelphia, Pa.; West Virginia—Brown Electric Equipment Co., Pittsburgh, Pa.; South Carolina—Engineer Sales Co., Columbia; Tennessee—Pitner's Manufacturing Co., Knoxville; Texas (North)—Electrical Agencies of Dallas, Dallas; Texas (South)—Electrical Agencies of Houston, Houston.

why Cavalier is YOUR BEST SOURCE FOR ELECTRIC HEAT

CAVALIER electric heat has real **quality.** It's easy to sell, pleases customers and eliminates costly service calls. (People are sick and tired of shoddy merchandise.)

CAVALIER has a complete line of electric heaters, all QUALITY GUARANTEED by a financially sound firm since 1865 for its policy of making quality products and pricing them fairly **at all times.**

CAVALIER equipment is soundly built. Each unit is individually energized and high potted with 1,000 volts. Although repair parts are rarely needed, they are promptly available at reasonable cost.

CAVALIER is active in NEMA and other organizations devoted to the advancement of the electrical industry, keeps to efficient trade channels and works to assure a business-like profit for the distributor and the contractor.

CAVALIER is your assurance of Highest Quality products with complete sales and merchandising helps, plus regular advertising in leading shelter publications.

Personnel and equipment of the specialized research, engineering and testing facilities for Cavalier electric heat are outstanding. Cavalier was one of the first quantity manufacturers of electric heat and has always built to Highest Quality Standards.

Cavalier has a complete line with quality features combined in no other line. **Automatic Electric Baseboard** — fully enclosed element with continuous vertical fin. Easiest cleaning of any baseboard on the market. Approximately 200 watts per lineal foot yet maintains low 125° surface temperature. Thermostatic control sections or wall mounted thermostat. 115 volt convenience outlet sections. Built in raceways for wire.

Send for catalog showing full line — Baseboard, Wall Insert, Portable, Bathroom, Floor Furnace, Cable Heat.

FIRST ▶ • *in quality construction* • *in engineering advances* • *in safety* • *in sales making features*

HEAT BETTER ELECTRICALLY

ELECTRIC HEATING DIVISION

CAVALIER CORPORATION, Chattanooga 2, Tenn.

Over 90 Years of Quality Products

LARSON INSTRUMENT Co., Tarrytown, N. Y., has announced the appointment of Tex-O-Koma Sales Co., 235 S. E. 14th St., Grand Prairie, Texas, as their sales representative to cover the states of Texas, Oklahoma, and Kansas.

• • •

KENNON AND JOHNSON, direct factory representatives, Atlanta, Ga., have been named representatives for Zenith Electric Co., Chicago, Ill. They will handle the Zenith lines of automatic transfer switches, magnetic contactors, remote control switches, program clocks, automatic reset timers, and cycle timers. Kennon and Johnson offices are at 7 Camden Rd., N. E., Atlanta, Ga.

• • •

MOLONEY ELECTRIC Company has announced the appointments of Robert T. Martin and L. R. (Dick) Hurley to their national district sales staff. Mr. Martin has joined the company as assistant to the manager of the Dallas, Texas, office. Mr. Hurley has been appointed district manager of the Narberth, Pa., office.

• • •

L. B. DREIFUS, vice-president and eastern division sales manager of NuTone, Inc., has announced the appointment of two new sales representatives to augment NuTone's sales forces in Tennessee and Virginia. Sam Edwards, headquartered in Knoxville, will be an associate of Bill Menchaca. Ray Shaw, Hampton, Va., will be an associate of Joe Dolfi.

• • •

APPOINTMENT of Curtis H. Stout, Inc., as manufacturers representative for the Pyle-National Company in the South-Central area has been announced by Elliot M. Nesvig, vice-president-marketing. The company manufactures electrical components for industry and military applications.

The Stout organization has offices in Jackson, Miss.; Little Rock, Ark.; Memphis, Tenn.; New Orleans, La.; and Shreveport, La.

Nesvig also announced that D. W. Jackson, formerly of the Pyle-National district office at New Orleans, has been assigned to the company's district office at Houston as a sales representative.

• • •

R T & E CORP., Waukesha, Wis., has appointed John Breaux as sales representative for the state of Tennessee and part of Georgia. He will be located at 1842 Sylvan Ridge S. W., Atlanta, Ga.

TWO NEW SOUTHERN district sales offices—one in Memphis, the other in New Orleans—have been opened by I-T-E Circuit Breaker Co., Philadelphia.

William L. Anderson has been appointed district manager of the new Memphis office located at 219 Adams

W. L. Anderson

J. T. Bauer

Ave. The Memphis office will serve the Arkansas, northern Mississippi and western Tennessee area.

Joseph T. Bauer was appointed district manager of the New Orleans office located at 1500 Carondelet St. The New Orleans office will serve the southern Louisiana area.

Texas contractors install two-way radio

THREE AMARILLO, Texas, electrical contracting firms now are using two-way radio in their operations.

Elmo Duke, of Duke Electric Co., the first contractor here to install the base radio and mobile units, says, "It gives us much more effective control over men and equipment." Radio transmission was made available to the contractors by the FCC only a year ago, Duke said. Each station is limited to 100 watts. The operational radius is about 25 miles.

Besides Duke Electric, Wilson Electric and Crown Electric are now radio equipped.

Duke, incidentally, is a member of the NECA Board of Governors.

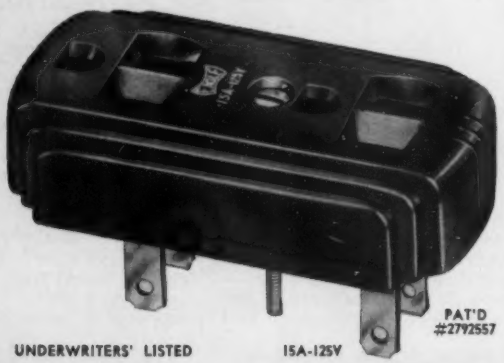
EAGLE AND ONLY EAGLE

CAN MANUFACTURE THIS EXCLUSIVE ITEM UNDER PATENT NO. 2792557

EAGLE

NO. 880

CONVERTS ANY GROUNDED RECEPTACLE TO A SAFE GROUNDED OUTLET



PAT'D #2792557

UNDERWRITERS' LISTED 15A-125V

TAKES NEW GROUNDED CAPS AS WELL AS STANDARD CAPS

Millions of old receptacles can now be converted instantly, permanently—to take the new grounding caps of portable electric appliances required by the National Electric Code. Tap this rich potential—get your share of this lucrative business—AT FULL PROFIT. Remember every user needs 2 or 3, or more. Sold thru wholesalers only. Order now!

INDIVIDUALLY CARDED FOR FAST SALES—AT FULL PROFIT

EAGLE ELECTRIC MFG. CO., INC., LONG ISLAND CITY, N. Y.

Ted Nemes appointed general sales manager

TED NEMES, nationally known appliance industry sales executive, has joined Meier Electric, Indianapolis, as general sales manager.

In announcing the appointment, Milton Keiner, president, stated that Mr. Nemes would direct and coordinate the sales of all Meier electrical products including the rapidly expanding electric heating equipment for homes.

Mr. Nemes' extensive background in the industry includes association with many nationally recognized manufacturers in the appliance field.

Brief news notes of manufacturers

LOUIS DUMAN, president of Advance Transformer Co., has announced completion of negotiations by which Advance Transformer Company will join Consolidated Electronics Industries Corp. Mr. Duman stated this new association will not change the basic policies and philosophies of Advance Transformer Co. The management and direction of the company will not change.

* * *

GROUND WILL shortly be broken for a new $500,000 plant for Precision Transformer Corporation at Centex Industrial Park in Elk Grove, Ill.

The new plant will be erected on five acres at the intersection of Pratt Blvd. and Nicolas Street and will have a total of 50,000 square feet. Plans for the new structure prepared by Northern Builders, Inc. are designed for ultimate expansion to 150,000 square feet.

* * *

GEORGE C. SCRIBNER has been appointed assistant sales manager of the Vulcan Electric Co., Danvers, Mass. In this position Mr. Scribner will be responsible for internal sales administration in addition to field liaison with representatives and distributors. He will assist L. A. Brett, sales manager.

* * *

THE EXECUTIVE offices of Sylvania Electric Products, Inc., have been moved into the General Telephone Building, 730 Third Ave., New York 17, N. Y. Remaining at Sylvania offices at 1740 Broadway, New York 19, N. Y., will be Sylvania International, various sales departments, the advertising department, and the marketing research department.

* * *

OPENING OF A NEW department for the manufacture and sale of secondary unit substations and low voltage switchgear was announced today by

SELL QUALITY!...SELL THERMADOR!

5,000,000 rooms will be built in new homes this year and Thermador has a Bilt-In Electric Heater for every one

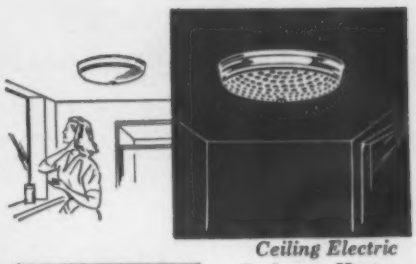
Your customer is being pre-sold on electric heating by national and local promotion and advertising. Every one of these 5,000,000 rooms that will be built in your area offers you extra profit if you sell and install Thermador Electric Heaters.

Thermador offers you a complete line of electric heaters for all applications. The well known bathroom heaters and the new fan-type ceiling heater which requires no rough-in box...heavy duty and medium wattage bilt-in fan-type units which keep heat where it belongs, in the "living zone"...and the newest addition to the line, baseboard electric heaters with the largest heat transfer area available.

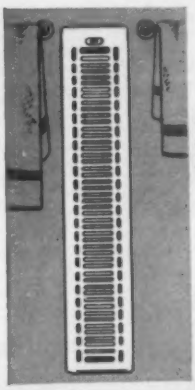
For over 30 years, Thermador has led the field in electric heating. Sell and install Thermador, the name that means reliability and quality for you and your customer. Over a million in use today.

Fill in the coupon below for full information on Thermador electric heaters for home, office, apartment, factory, hotel and school.

Also available, full line of 110 and 220 volt heavy duty portable electric heaters.

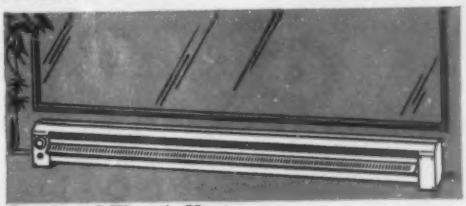


Ceiling Electric Bathroom Heater



Full-Length Bathroom Electric Heater

Space Saver Bathroom Electric Heater



Baseboard Electric Heater

Large Room Fan-Type Electric Heater

Small Room Fan-Type Electric Heater

Originator of the Fan-Type Electric Heater

THERMADOR ELECTRICAL MANUFACTURING CO., Dept. 224

A Division of Norris-Thermador Corporation

5119 District Blvd. • Los Angeles 22, California

Please send me illustrated Bilt-In Heater literature.

"Seven Leagues Ahead"

NAME _____

ADDRESS _____

CITY _____ STATE _____

Pennsylvania Transformer Division, McGraw-Edison Co. Production facilities and offices, which are located alongside the company's transformer manufacturing plant in Canonsburg, Pa., were "unveiled" recently at a plant tour attended by representatives of industrial and utility companies in New York, Ohio, and Pennsylvania.

S & C Electric Company will break ground this summer for a new engineering research building adjacent to its Ridge Ave., Chicago, manufacturing plant, according to John R. Conrad, president. The building, to be completed in 1960, will house all of the company's engineering and research offices and laboratories.

Engineering research building planned for S & C Electric Company

They both know the best buy in tape . . .

ACCURATE TAPES

FRICTION . . . . RUBBER . . . . PLASTIC

non-raveling
straight tearing
high tensile strength
strong adhesion
highly insulating

Send today for our most recent bulletin describing details.

ACCURATE MANUFACTURING COMPANY
Garfield, New Jersey

Helpful literature

Bulletin GEA-6822, 16 pages, from **General Electric Co.**, Schenectady 5, N. Y., describes GE's line of easy-to-use controls for virtually every industrial counting, sorting, signaling, protecting, diverting, detecting, or limiting job. Included are descriptions, specifications, and pricing data on General Electric's self-contained relay, transistorized relay, high-speed relay, explosion-proof relay, long-distance relay, smoke-density indicator, electronic timer, cut-off register control, side-register control and other electronic devices of these types.

Write B-919 on reply card, page 21.

High-voltage current limiting **fusistor-type fuses** for protecting potential transformers, small service transformers, control transformers and auxiliary power transformers are described in Bulletin 281 recently produced by the **S&C Electric Co.**, 4435 Ravenswood Ave., Chicago, Ill. Operating voltages range from 120v to 14.4kv with interrupting ratings to 130,000 amp, RMS asymmetrical.

Write B-920 on reply card, page 21.

Informative data on "Wiring and **Wiring System Standards** for Industrial Use" is now in bulletin form, available through salesmen of **Rome Cable Corp.**, Rome, N. Y.

R. C. Graham, chief engineer at Rome Cable, first presented the bulletin's technical information to the Commercial and Industrial Wiring Conference of the Pacific Coast Electrical Association in Los Angeles.

Write B-921 on reply card, page 21.

Full information on the complete line of Smithcraft Speedomatic **troffers** can be found in a new 6-page catalog recently released by **Smithcraft Lighting**, Chelsea, Mass. Included with the catalog are 13 separate pages describing Smithcraft spot boxes, a wide variety of shielding media and Smithcraft's complete Ceiling Index.

The new folder details for architects, engineers, contractors and other lighting specifiers many interesting features of Speedomatic troffers, including the exclusive telescopic door frame, which automatically adjusts to assure perfect fitting, even in irregular ceiling openings.

Write B-922 on reply card, page 21.

Bulletin No. 74, "Feedrail Electrification and Automatic Pin-Positioning Machine Service Car for Bowling Alleys", has been issued by **Feedrail Corp.**, 125 Barclay St., New York 7, N. Y.

Included is a description of the traveling **service car** designed to

carry an attendant as he makes his inspection of machines, transport pins to and from the machines and be a working platform and rolling workshop whenever service is necessary.

Write B-923 on reply card, page 21.

New bulletin B75 on Joy String-a-lite **portable lighting equipment** for oil and gas derricks, masts and associated areas has been published by **Joy Manufacturing Co.,** Electrical Products Division, 1201 Macklind Ave., St. Louis 10, Mo.

Information on the entire line of String-a-lite lighting, with assemblies for all types of masts and rigs, is contained in the 8-page illustrated bulletin.

Write B-924 on reply card, page 21.

One man can install service entrance connections without the use of tape or a "third hand" by a simple three-step method described and pictured in a bulletin from **Burndy Corp.,** Richards Ave., Norwalk, Conn. Standard compression tools and the new "Insulink" connectors from Burndy make **service entrance splices** that are neat, electrically stable, and fully protected against moisture and accidental contact.

Write B-925 on reply card, page 21.

The Superior Electric Co., 83 Laurel St., Bristol, Conn., has made available a bulletin describing their flexiformer, **packaged transformer primary.** Detailed instructions for the use of the "do-it-yourself" transformer are given and illustrated in the brochure. Also included are construction features and specifications.

Write B-926 on reply card, page 21.

Plastic pipe for electrical conduit from **Southwestern Plastic Pipe Co.,** P. O. Box 117, Mineral Wells, Texas, is described in an illustrated bulletin issued by the company. Construction features, advantages, installation procedures, and catalog data on the plastic pipe are included in the brochure.

Write B-927 on reply card, page 21.

A new **1959-1960 catalog** was recently released by **White-Rodgers Co.,** 1209 Cass Ave., St. Louis 6, Mo. Listing the firm's entire line of automatic controls for heating, refrigeration, and air conditioning, the 56-page catalog contains many new products and is the largest ever released by White-Rodgers.

Write B-928 on reply card, page 21.

An 11-page booklet describing their line of **flood lighting standards** is available from **Kerrigan Iron Works, Inc.,** P. O. Box 479, Nashville 2, Tenn. Contained in the booklet are catalog data, diagrams of the equipment, specifications, and suggested methods of wiring supply to floodlights, as well as other installation procedures.

Write B-929 on reply card, page 21.

CHAMPION
of
the
four
major
brands
of
lamps
CHAMPION stands out for VALUE
The last analysis . . . the cost of light . . . is the first concern of Champion . . . where no lamp leaves unless it meets the highest value standards in the industry.
Champion Lamp Works, Lynn, Mass.
CHAMPION
Lamps

Technical books

for the electrical man

Revised Code

"National Electrical Code," 1959 Edition. Published by National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass., 528 pages, $1.00.

The new 1959 National Electrical Code is now in print and available, it has been announced by its sponsor, the National Fire Protection Association.

The 1959 Code is a complete revision of the previous edition issued in 1956. The official text, now published by NFPA in a sewed, paperbacked, pocket-size edition, has 528 pages.

It incorporates a substantial number of important new electrical safety provisions adopted at the recent NFPA annual meeting. There have been extensive editorial revisions and clarifications of the text, including placement of the tables and diagrams, formerly in Chapter 10, in their appropriate spots in the text.

A most important change is a completely new system of numbering sections and paragraphs. Hereafter references to the Code will use the new numbers. The new NFPA edition includes a cross reference index to the previous numbering used in the 1956 Code.

The new Code is the result of most extensive work on the part of the NFPA National Electrical Code Committee, its correlating committee and the code making panels.

Book writing help

"Writing and Publishing Your Technical Book." Published by F. W. Dodge Corp., 119 W. 40th St., New York 18, N. Y., 50 pages. (No charge).

This booklet is written to help authors organize and develop their ideas for business, professional, or technical books to the point where they can obtain the support and backing of a publisher. It answers a great many questions about the author-publisher relationship, and it also presents many practical checklists for preparing material for publication.

The publishers believe that a great many potentially successful authors hesitate to contact publishers with a manuscript idea because they are unsure of one or more things: They may not know how to choose and approach a publisher. They may think the publisher does not want to see them before they have a completed manuscript. They may not know what the publisher will expect from them once they begin a writing project. They may have only a dim idea of how a publisher operates.

This new manual answers these and hundreds of other questions. Among its chapters are: Should You Write a Book?, Planning for Success, Choosing a Publisher, The Prospectus and Outline, Writing the Specimen Chapters, Acceptance and the Contract. A great deal of little-known information about the workings of business and technical publishers is also included. Another unusual feature is a point-by-point discussion of the author's contract in which the responsibilities of all parties are fully outlined.

Radio systems

"Two-way Radio," by Allan Lytel. Published by McGraw-Hill, 327 W. 41st St., New York 36, N. Y., 304 pages, illustrated, $9.50.

This newly-published book is a complete guide to two-way radio—from description of a typical radio system and its many uses in business and industry, to technical information on transmitters and receivers, circuit details, selective calling methods, and methods of installation, trouble shooting, and repair. In a single, compact volume, it provides an introduction to the theory and practice of voice-modulated radio communications that covers mobile (vehicle) and base-station (fixed) radio transmitters and receivers, plus the related test equipment.

The book provides a logical, step-by-step review of the whole field, and covers both AM and FM transmitters and receivers, antennas, selective calling methods, power supplies, installation, and servicing. Individual topics that are treated include digital pulse codes, power sources, transmitter tuning, use of the crystal calibrator, phase-shift modulators, split-channel operation, dial codes, oscillator circuits, and a great deal more.

In addition, information is included on the test equipment and measurement devices required for work in this field—AM and FM signal generators, RF signal generators, wavemeters, grid-dip meters, heterodyne and interpolating frequency meters, and modulation meters. Recent developments, such as single sideband, suppressed carrier double sideband, and synchronous AM are included.

FEATURE FOR FEATURE —THE CABLE THAT WILL STAND-UP AND STAND-OUT IS--- ⇨ AMERICAN *Bonded* ARMORED CABLE

American Bonded is the standout in every job where easy installation, rugged performance and day-in, day-out dependability are demanded. That's because every inch of American Bonded is designed to stand up and take every test that's put to it and still deliver uninterrupted operation. It's another reason why, wherever armored cable is required, the best investment is in American Bonded.

AMERICAN METAL MOULDING CO.

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Atlanta Warehouse	Houston Warehouse	Dallas Warehouse
C. C. MYRICK	PEABODY BROTHERS	PEABODY BROTHERS
516 Elm, N. W.	240 Shea St.	2903 St. Louis St.
Atlanta, Georgia	Houston 2, Texas	Dallas, Texas

New products

New line of low cost floor boxes introduced

STEEL CITY Electric Co., 1207 Columbus Ave., Pittsburgh 33 Pa., has just introduced a completely new line of low cost electrical system floor boxes called Catalog Series No. 88.

New Catalog Series '88' is designed for conduit installation in the floor

with outlets at the floor surface to accommodate telephone, intercommunications, light and power.

Series '88' floor box units are an assembly comprised of a special 4-inch octagon outlet box, threaded outlet box cover, bronze adjusting ring, and bronze floor plate with removable insert. Outlet boxes and box covers are electrogalvanized.

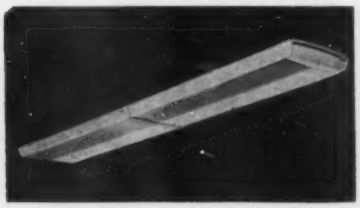
Octagon outlet boxes are available 1½" deep with two ½" and two ¾" knockouts in the sides, or 2⅛" deep with two ½", and two ¾" knockouts in sides, or four 1" knockouts in the sides. All boxes have three ½" and two ¾" knockouts in bottom.

Write P-930 on reply card, page 21.

Plastic prismatic refractor totally encloses luminaire

A NEW DESIGNER group of contemporary styled fluorescent commercial luminaires has been announced by Curtis-AllBrite Lighting, Inc., 6135 W. 65th St., Chicago 38, Ill.

First in this new series are the Re-



AS AN INDUSTRY LEADER . . .

SUMMERS BUYS ONLY FROM QUALIFIED PEOPLE, OFFERING FINE SERVICE AND QUALITY PRODUCTS...

Alvin Pruitt, Summers Vice President, Paine's Chase Coffey and Dan Galvin, President of Galvin Sales Company, agree on the importance of dealing with experienced, well-established companies offering quality products.

PAINE People And Products Are Your Best Buy In Electrical Hanging, Fastening Devices...

What does it take to be your best supplier? The first thing most of you would say is — "You must offer the best products at a reasonable price backed up with service." But if you probe beyond the products, you come to people. And more than any single factor, people make the difference.

It takes people to make and sell products. And leaders in any field insist on people with know-how, experience, ingenuity and perseverance. People with these qualities, selling quality products, always give you the best buy and service.

Summers Electric Supply Company, a southern industry leader, is one of the many firms that believes Paine people and representatives like Dan M. Galvin have these qualities. The Paine name signifies people of high caliber servicing people with the same high-level business practices. Stop in today, try Paine products at your local supplier, and see for yourself.

THE PAINE COMPANY, 12 Westgate Road, Addison, Illinois

the best craftsmen always take PAINE'S

Spring Wing Toggle Bolts	Conduit Clamps	Star Drills
Expansion Anchors	Pipe Hooks and Straps	Malleable Shields
"Sudden Depth" Drills	Hanger Iron, perforated	Special Hanging and
Wood Screw Anchors	Expansion Shells	Fastening Devices

gula and Visitron luminaires which embody fresh styling concepts of modern interior design. The Regula features a functional crystal plastic prismatic refractor to lend sparkle to the decor while totally enclosing the luminaire to minimize maintenance.

The Visitron's one-piece, white plastic diffuser also totally encloses the lamps to virtually exclude the entry of foreign matter while providing a luminescent quality pleasing to the eye.

Both luminaires feature stylish shallowness, and balanced proportions keyed to current styling trends. They are available for two or four 40-watt rapid start fluorescent lamps and may be installed individually or in continuous rows, either on the ceiling or pendant, in a wide range of commercial lighting applications.

Write P-931 on reply card, page 21.

Finger ballasts for use in confined area applications

A NEW LINE of 4, 6, 8, and 15-watt finger ballasts has been introduced by Universal Manufacturing Corp., 29-51 E. Sixth St., Patterson 4, N. J. The ballasts are for use with fluorescent fixtures in display cases, interior cabinet lighting, and other confined area applications.

The new finger ballasts are of the

preheat type, operating at 118 volts, 60 cycles, in one-lamp fixtures. In addition to these miniature models, Universal also makes a full line of preheat, trigger-start, rapid-start, slimline, and power groove fluorescent lamp ballasts.

Write P-932 on reply card, page 21.

Plastic conduit, durable and easy to install

SOUTHWESTERN Plastic Pipe Co., P. O. Box 117, Mineral Wells, Texas, has available plastic pipe for electrical conduit. The plastic conduit, lightweight and easy to handle, has proved adaptable to even the most complex electrical systems.

It weighs less than one-fifth as much as steel conduit. No special load-bearing supports are necessary for construction and installation. Two men can easily install large diameter conduit without special hoists and other equipment.

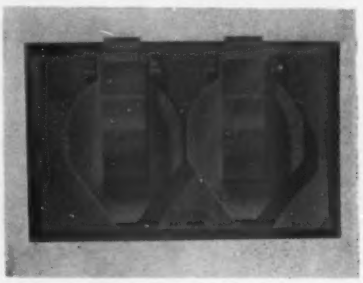
Southwestern conduit resists corrosion, is non-sparking, explosion-proof, and resists abrasion. It is easy to cut, easy to bend, easy to assemble, and easy to support. The smooth interior finish of the conduit is permanent. Wire pulling is easy, and no lubrication is necessary. Plastic conduit never requires painting or other care, stays clean, and will never mar the appearance of adjacent fixtures or structures.

Write P-933 on reply card, page 21.

Aluminum weatherproof cover protects outdoor type outlet

A SOLID ALUMINUM weatherproof cover with a simplified, positive "stay-open stay-shut" action is being manufactured under the trade name Flip Lid by Slater Electric & Manufacturing Co., 45 Sea Cliff Ave., Glen Cove, N. Y.

The patent pending features of the Flip Lid assure easy installation. The lid flips open with a flick of the



finger and stays open. This feature has two advantages: (1) It permits easy alignment and rapid installation; (2) It permits fast, one-handed insertion of male plugs. The same design features which allow flip-open stay-open action also assure the Flip Lid closes just as easily, just as positively.

Special stainless steel springs, extra thick aluminum sections and lids, weather-tight construction, ease of installation and long service life are other features of the cover.

Write P-934 on reply card, page 21.

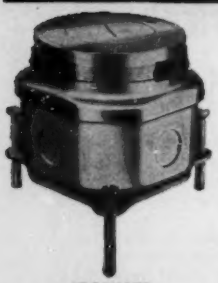
Rapid start ballasts feature versatility

VERSATILITY is the keynote of a new series of high output rapid start ballasts added to the line of the Universal Manufacturing Corp., 29-51 E. 6th St., Paterson, N. J. These new units are designed primarily for non-weatherproof use in outdoor fixtures and signs for low ambient temperatures down to -20° F.

Catalog Number 500-S is an 800 ma, 120-volt, 60-cycle, high power factor ballast for use with any three

Latrobe PRODUCTS

FLOOR BOXES · WIRING SPECIALTIES



This "Tru-Level" box is very easy to install — with its 3¼" opening, it enables the inside attachment of conduit without removing the box body cover.

It is a sheet steel, galvanized 4" octagon watertight box, 2 ½" deep, developed for concrete, tile or wooden floor with concrete base.

Quick and easy tru-leveling, with ½" adjusting ring and 2½" long screw legs.

Listed under re-examination service of
UNDERWRITER'S LABORATORIES, INC.

PRODUCTS

Floor Boxes • Cover Plates
Pipe or Conduit Hangers
Gang Boxes • Junction Boxes
Cable Supports
Nozzles • Fish Wire
Insulator Supports
Staples and Cable Clips

INSULATOR SUPPORTS

Insulator Supports are safe and sure for fastening glass or porcelain insulators to exposed woodwork. 4 sizes, from 1" to 2½".

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CARY CHAPMAN & COMPANY
702 Whitehall St., S.W., Atlanta, Ga.
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1009 South Elm St., Greensboro, S. C.
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301 East 10th Ave., Hialeah, Fla.

F. P. WALTER COMPANY
4030 Chouteau Ave., St., Louis 10, Mo.

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ARTHUR H. SWARTZ
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FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

UNHAPPY *at* RISING COSTS?

—How long can you afford to put off switching to

UNION

NON-METALLIC BOXES

THOUSANDS HAVE ***AND CUT COSTS!***

C.S.A. Approved

UNION INSULATING CO.
Parkersburg, West Va.

lamp combinations of 36", 48", 60", 64" and 72" high output rapid start lamps. One 96" or two 84" lamps can also be used in this combination as long as the total length of the three lamps does not exceed eighteen feet. Catalog Number 500-S-14 is provided with 14 gauge lead wire for use in outdoor signs and will perform the same as Catalog Number 500-S. Catalog Number 500-FL-14 is for flashing.

Six additional non-weatherproof, outdoor, rapid start ballasts have been introduced by Universal to use for low ambient temperatures down to 0° F.

Write P-935 on reply card, page 21.

Service entrance caps added to fittings line

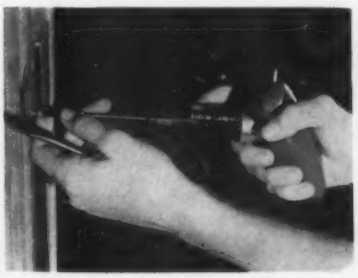
ALLEN-STEVENS Conduit Fittings Corp., 33-53 62nd St., Woodside 77, N.Y., has added a new category of items—service entrance caps—to their line of die-cast conduit fittings. These caps feature an extremely smooth

clean surface throughout. They are of sturdy construction and have extra roominess inside of the head to accomodate cable bend. Special case hardened screws assure solid hold on the conduit. The caps also feature rapid assembly on either rigid or E.M.T. without adaptors.

Write P-936 on reply card, page 21.

Ratchet screw driver for home and workshop

A NEW RATCHET screw driver for the home and workshop has been developed by Cuyahoga Products Corp., 10254 Berea Rd., Cleveland, Ohio, subsidiary of Republic Industrial Corp. It is said to give five times more effective force than an ordinary



ONLY EDWARDS MAKES A COMPLETE LINE of signaling products for control, communication and protection.

SOLD ONLY THROUGH ELECTRICAL DISTRIBUTORS (with these complete sales programs from Edwards for their use)*

- "sound partnership program"
- "industrial modernization"
- "product information"

(*endorsed and supported by national and regional distributor and contractor associations)

INSTALLED BY ELECTRICAL CONTRACTORS who prefer Edwards 4 to 1 for simplicity and quality that means quicker installations, no callbacks.

BACKED-UP BY EDWARDS TECHNICAL SPECIALISTS in 58 cities who work with distributor, contractor, architect and engineer.

TEAM-UP WITH EDWARDS Ask your local Edwards representative how modern signaling (clock systems, fire alarms, drop and lamp annunciators, audible signals, etc.) can benefit you, or write Edwards Company, Inc., Norwalk, Connecticut. (In Canada: Edwards of Canada, Ltd, Owen Sound, Ontario.)

DO BUSINESS WITH THE TEAM THAT'S SETTING RECORDS

EDWARDS

For LOW COST Outdoor Lighting...Signs...Signals!

HOPE

METAL-PIPE POLE BASES

A Rugged Support for Threaded Pipe Uprights With Chamber for Splicing and Grounding.

EASY TO FABRICATE—Turn galvanized conduit or pressure pipe (single or coupled lengths) into threaded hub of base, and top-off with the fixture of your choice. Install over embedded anchor bolts and conduit stubs. Splice and ground through generous hand-hole—and the job is done.

Four base sizes permit simple fabrication of poles for a limitless variety of small and large fixture loads at varying elevations.

PROVED IN USE—Attractive installations for lighting parking areas, gas stations, railway platforms, sub-stations, industrial plants and shipping areas, sewage disposal works, pumping stations, schools, churches, hospitals, motels, marinas, resorts. Also as supports for signs and signals. Plain gasketed or 3 pole receptacle cover.

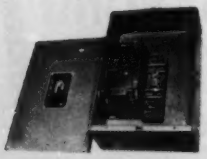
2" — H42200
2½"— H42250
3" — H42300
4" — H42400

Bulletin #25

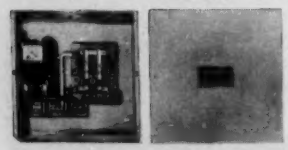
HOPE ELECTRICAL PRODUCTS CO.
41 Long Avenue, Hillside, N. J. • ELizabeth 4-7837

PIONEER DEMAND CONTROLS... THE MOST EFFICIENT METHOD OF HOUSEHOLD ELECTRICAL DISTRIBUTION DEMAND CONTROL

★ LOAD MISER ★ RATE SAVER



The Load Miser is the most economical adequate method of adding heavy current appliances — dryers, quick recovery water heaters.
- Prevents overloading of electrical circuits
- Complete range of demand controls for electric heat and auxiliary heat available.



The Rate Saver is the ideal control mechanism for electrical heating installations where the rate structure contains demand charges.
- Automatically limits the TOTAL LOAD
- Keeps the customer within his existing 100 amp service entrance rating and reduces demand rate charges.

PIONEER CONTROLS, INC.
3627 Peachtree Road, N. E.,
Atlanta, Ga.
Division of Pioneer Electric
Manufacturers of Transformers, Switchgear and Demand Controls.

screw driver and easily seats any screw in seconds.

Called the "Power-Egg", the new ratchet screw driver is claimed by the company to be the first basic improvement in manual screw drivers in 25 years. It features a sturdy, egg-shaped Tenite handle which contains an aluminum ratchet mechanism. Three hardened SAE 1070 steel drivers, ¼", 3/16", and 5/16" in size, with Tenite handles complete the set.

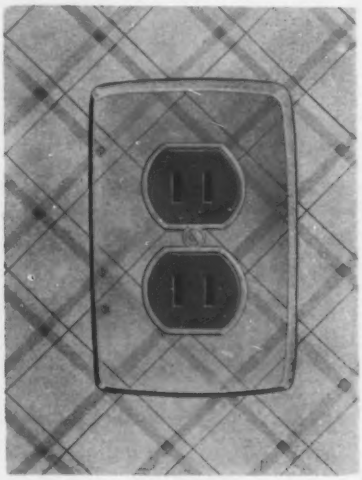
Anyone can operate the "Power-Egg". Simply insert the correct size driver into the ratchet mechanism, lock it in place, then seat the screw easily by turning the "Power-Egg" handle. The principle is the same as a ratchet socket wrench used by mechanics to obtain powerful leverage.

Write P-937 on reply card, page 21.

New receptacle cover plate added to company's line

THE REMCON Division of Pyramid Instrument Corp., 630 Merrick Rd., Lynbrook, N. Y., has announced the addition of a brand new receptacle cover plate to their line of low-voltage switching devices.

Aside from the simplicity and soft-



ness of line which gives this new receptacle cover plate its decorative appeal the RCP plate is available in a choice of materials—buff (ivory) and clear to match the Remcon line of high fashion switch plates.

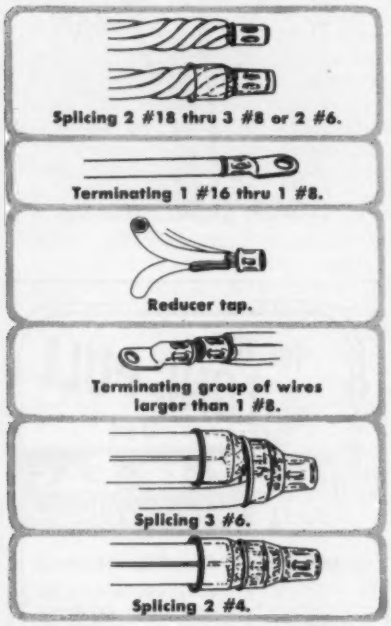
A gold tone insert is included with each clear plate. When placed behind the plate "as is" a feeling of richness is created which adds to the over-all beauty of any decorative scheme. For those who prefer color matched receptacle plates, the gold tone card can be painted to match the wall or used as a pattern for making a wall-paper insert. Interesting effects can also be achieved by replacing the insert with a swatch of upholstery or drapery fabric.

There is a complete line of low-voltage switches, switch plates, and a

do all these wiring jobs and more with just one BUCHANAN pres-SURE-tool

You use *just* one Buchanan C-24 pres-SURE-tool to install both Buchanan Splice Caps and Buchanan Termend® lugs. Only two sizes of all-copper Splice Caps splice from 2 #18's thru 3 #8's or 2 #6's. Just one size all-copper Termend lug terminates from 1 #16 thru 1 #8 (or any equivalent combination of 2 or more wires).

Buchanan Splice Caps and Termend lugs are self-positioning in the tool and provide high strength, vibration proof connections.


Splicing 2 #18 thru 3 #8 or 2 #6.
Terminating 1 #16 thru 1 #8.
Reducer tap.
Terminating group of wires larger than 1 #8.
Splicing 3 #6.
Splicing 2 #4.

Write for pres-SURE-TIPS —showing how Buchanan pres-SURE-connectors do the work of two, three or four conventional solder or solderless devices. Ask for Bulletin S-9

Approved for splicing 2 # 18 thru 3 #8 or 2 #6 and for terminating 1 #16 thru 1 #8. Insulators approved for 600 volts on building wire, 1000 volts in fixtures and signs,-in applications to 105°C. (221°F.).

STOCKED BY LEADING ELECTRICAL DISTRIBUTORS EVERYWHERE

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ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, N. J.

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ST. PETERSBURGH - SHREVEPORT
and other principal cities

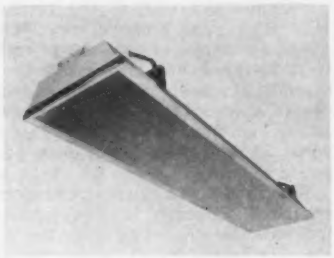
nine position master control available for a complete low-voltage installation. The major feature of the Remcon line of low-voltage switching is the incorporating of the low-voltage transformer right inside the relay itself. This reduces the cost of installation and increases the flexibility of the system.

Write P-938 on reply card, page 21.

Speedomatic troffers available in four types

A NEW SERIES of one- and two-foot wide troffers has been introduced by Smithcraft Lighting, Chelsea, Mass. The new Smithcraft Speedomatic troffers recess only 4-15/16", and are available in four basic types that fit all ceilings.

One feature of the Speedomatic troffers is Smithcraft's telescopic door frame, which automatically adjusts to assure a good fit, even in irregular ceiling openings. When installed the shielding is framed in ceiling by a single width of metal, offering a maximum illuminated area and a clean, finished appearance. There are



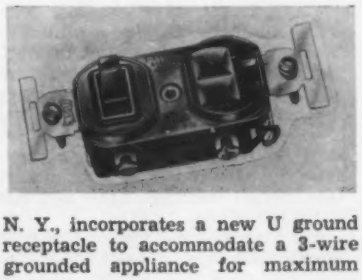
no mechanical catches. The door opens by simply lifting up, sliding over, and lowering.

Among the features that make the new troffers easy to install is Speedomatic's wiring access door which offers ample room to reach BX, Greenfield, or other cable and attach to plate after fixture is in ceiling.

Write P-939 on reply card, page 21.

Combination device has new U ground receptacle

THIS NEW Eagle combination device, Catalog #991, developed by Eagle Electric Mfg. Co., Inc., 23-10 Bridge Plaza, South Long Island City,



N. Y., incorporates a new U ground receptacle to accommodate a 3-wire grounded appliance for maximum

There once was a Dealer named Dick
Had some stiff competition to lick —
Till he handled the brand
Known for quality, and
That clever move turned the trick.

*progress, OF COURSE

"Showcase of Tomorrow"

Put yourself in the million-dollar replacement-fixture business with the DR-48-F Display, complete with 36 assorted Progress fixtures. All units are completely pre-wired, including switches. Don't miss a sale!

PROGRESS MANUFACTURING CO., INC.
Dept. ES-9 Phila. 34, Pa.
Please send me
☐ complete information on DR-48-F
☐ name of local distributor
NAME.....
COMPANY.....
ADDRESS.....

Profits

BUILD ~~BUSINESS~~

ELECTRICALLY!

RELY ON.....

National Price Service

Then.....

You can BE SURE of your material costs!

You can BE SURE that your resale prices include all overhead expense plus — A FAIR PROFIT !

HENDERSON-HAZEL CORP. Dept. G-99
13601 EUCLID AVENUE • CLEVELAND 12, OHIO

Gentlemen:
Please send me the complete story of National Price Service, how it will keep me up-to-date with changing material prices, and suggest profitable resale prices—quickly. No obligation.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

NPS National Price Service
HENDERSON-HAZEL CORP.

13601 EUCLID AVENUE • CLEVELAND 12, OHIO

safety, as well as a single pole switch.

The Eagle #991 will also accept any 2-wire plug. The outlet can be wired independently of, or controlled by, switch. Heavy phosphor bronze "T" contacts insure long life. Switch and receptacle are on same circuit; common terminal marked "line."

This Eagle combination device #991 is equipped with ⅜" long screws, with starting die points and plaster cleaning threads, already mounted on straps and held by a washer.

Write P-940 on reply card, page 21.

Versatile "do-it-yourself" transformer available

THE SUPERIOR Electric Co., 83 Laurel St., Bristol, Conn., now has available the new versatile "do-it-yourself" transformer, called the Flexiformer packaged transformer primary, which makes stocking of many fixed-ratio transformers unnecessary.

Essentially, a Flexiformer is a self-contained toroidal primary coil consisting of a strip-wound silicon steel core having a coil of 400 turns of #24 B&S guage copper wire. When used as a source of a-c voltage, simply hand-thread the proper number of secondary winding turns through the center opening to obtain the desired output voltage. Input rating is 120 volts, 50/60 cycles, 1-phase and output is 150 va.

When used as a current transformer, the Flexiformer winding becomes the secondary winding with the current induced by a wire passing through the center opening. Used with a 0-1 ampere ammeter, currents up

to 400 amperes can be measured with an accuracy of 1% at 60 cycles.

Flexiformers, says Superior Electric, eliminate the time-consuming task and cost of obtaining the right transformers for each new job. They are useful in laboratory and shop, especially when high amperage at low voltage is required. They can be used for testing the current carrying capacity of contacts, connectors, relays, circuit breakers, fuses and similar applications.

The educational possibilities of Flexiformer are unusual. They can be used in classroom demonstrations of basic transformer principles as well as to serve as working laboratory equipment.

Write P-941 on reply card, page 21.

Post lantern accessory operates without switches

PROGRESS Manufacturing Co., Castor Ave. and Tulip St., Philadelphia 34, Pa., has announced the manufacture of a new accessory for post lanterns which automatically controls the on-off operations of outdoor lanterns.

The new accessory, named "Liteguard," operates automatically with-

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out any switches. It is activated by a modern photo electric cell that turns on the post lantern at dusk and then again automatically turns off the post lantern at dawn.

The Lite-guard is made to fit any 3″ post, hold all standard lanterns.

Write P-942 on reply card, page 21.

Code discussion

(Continued from page 112)

in enough delay in the operation, usually, to allow the arc to ignite certain materials.) In order for 30 amperes to flow in this 120-volt circuit, the total resistance must be not more than 4 ohms. (120 divided by 30 equals 4).

If the fault occurred at the far end of the 100-foot run between the hot conductor and the armor, the *known* resistance of the armor and wire would not exceed 0.75 ohms for the armor and 0.268 ohms for the 100 feet of tinned #14 copper wire, or a total of 1.018 ohms. This seems safe enough, but the 4 ohms minus the 1.018 ohms leaves a margin of only 2.982 ohms that can be safely added by the electrician. That means that connections must be made at the terminals, for both the armor and the wire, at 8 lights, at whatever switching is used, and at the circuit supply; and this must be done in such a workmanlike manner that less than 3 ohms is added to the total resistance by all of these connections in series. (See illustration.)

An electrician can do this—if he will. Can the amateur do it? The inspector's job to see that it is done in such cases is not always easy. For instance, it is practically impossible to thoroughly check all of these connections on every job. They usually can be spot-checked only. (That may be why some inspectors seem cross at the sight of slip-shod work). It is also a good reason why electrical work should be entrusted only to competent electricians.

What is said here regarding tight connections applies also, of course, to all connections for conductors and metal raceway and busway systems. But there seems to be a little more tendency for the incompetent to tackle armored cable than some of the other wiring systems which are more difficult to install. In any case, it usually is installation methods which determine whether a job is safe or not, provided that only approved and UL listed material is used.

The next discussion in our series will begin with Article 336 of the Code. Because these articles are prepared about two months before publication, it is difficult to say at this time just where we will break off and review the new Code changes before proceeding further. You can rest assured, however, that these changes will be discussed with you before the date on which they will become effective.

Answers to Code test questions: (1. **T** section 3301) (2. **T** section 3301) (3. **F** section 3303) (4. **T** section 3306) (5. **F** section 3302) (6. **c** section 3343) (7. **a** section 3344) (8. **a** section 3347) (9. **c** section 3342) (10. **b** section 3342).

Know the law

(Continued from page 116)

son agreed upon by the parties to pass upon the work has no right to delegate his authority to another, and if he attempts to do so, the decision of such other person is not conclusive on the parties, unless they agree to such substitution. 9 Am. Jur., Building and Construction Contracts, Section 35, p. 25.

"Under the contract the defendant had the right to have its work passed on by A. Thomas Bradbury personally and Mr. Bradbury could not delegate his duties as architect to another so as to bind the defendant without his consent such as would amount to a novation [substitution] of the contract.

"The only evidence which tended to show that the defendant looked upon Mr. Slay, [the associate] as the architect was a notation on the bottom of the letter written by the defendant to the plaintiffs, the notation being as follows: 'cc: A. Thomas Bradbury, Architect, Att: Mr. Ralph Slay.' This standing alone is not sufficient to authorize a finding that the defendant ever agreed to a substitution of Mr. Slay for Mr. Bradbury as architect or that there had been a novation of the contract to this effect or an acquiescence on the part of the defendant or an estoppel against the defendant. The defendant's officer who wrote that letter explained that he had not directed that such notation be placed at the bottom of the letter but that it must have been placed thereon by his secretary.

"Since the plaintiffs tore out the defendant's tile work without its having been disapproved by the architect named in the contract thereby depriving the defendant of the right to have such work approved or disapproved by that

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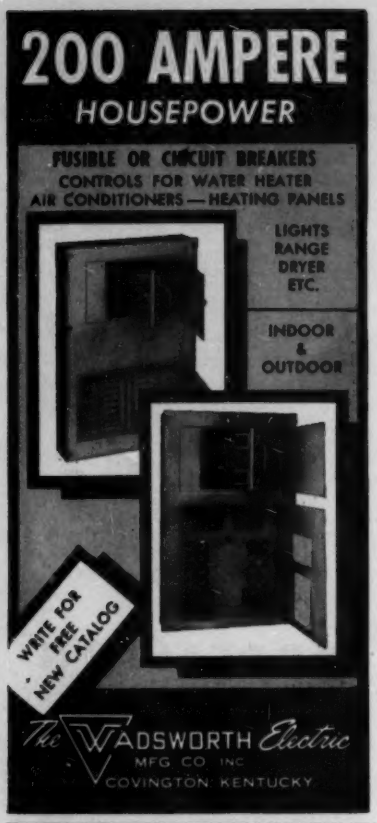

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named architect, the plaintiffs cannot recover for the costs of such tearing out and relaying of a new tile floor, and the defendant is entitled to the remainder of the contract price being withheld by the plaintiffs."

Boost knowledge

(Continued from page 40)

them quickly pinpoint the trouble.

Take the variable-voltage auto transformers used for dimming lighting circuits. Before long, most houses will be obsolete without them. While they are relatively troublefree, the contractor who expects to sell the customer on them and who will thus be required to connect and maintain them, will do himself a favor if he understands their operating principles. Possessed of such technical know-how, and a belief in the potential and usefulness of a new development; he will sell the idea to his customer and thus upgrade the wiring job.

In the case of residential air conditioning packages, and run-of-the-mill commercial air conditioning installations, it is a simple task to wire to the motor starter, tie onto the motor lugs, and wish the job well. But assume the job involves such items as remote-mounted pressure switches, starters, or specialized control devices, or, as in the case of mushrooming housing developments which are now installing their own individual sewage treatment and water supply plants, these involve about every operation from a simple motor hook-up to complex wiring from float switches, special circuits, the operation of emergency standby units—all of which must be Code wired for maximum safety to personnel.

To trouble-shoot on these involves a knowledge of operating characteristics no contractor can afford to ignore if he is to reap the profit harvest inherent in the sale and installation of such wiring and equipments.

Take a simple item like a single-pole lighting switch that can be bought in the five and dime store. Even a ten-minute study of it will profit the electrician no end.

If the job specs call for a: ". . .x-brand switch or equal to. . .", the contractor has no other course but to comply. Which means he needs to know little about the switch. But on a remodeling job—residential or commercial—where there are no specifications, and especially where the contractor has obtained the job on a contract price, he will likely use the cheapest switches he can get from his supplier, just so he can "get by" on the job.

But assume there is a heavy tungsten load, he then needs to know enough to install a T-rated switch because it is capable of taking the rush of starting current, whereas a non-T-rated switch is not. As a consequence, the non-T-rated switch, being 40 cents in cost against an equal 10 amp. capacity T-rated switch at $1.35, will burn out prematurely, and the contractor is then faced with a call-back. Considering the extra cost of 85 cents for the T-rated switch against the cost of sending a truck and man to replace a switch 10 miles from the shop, it must be obvious that a "little larnin' goes a long way."

Again by studying current literature on electrical equipment and devices, the contractor can become more conversant with their use and can benefit from their time-saving features. At the same time, the new developments can help him to

give his customer a better job.

Admittedly, the modern electrical man needs to have far more superior technological training than, for example, his counterparts in other building trades like the carpenter, the cement finisher, painter, or tile-setter, etc. Electrical contractors have proved this in pulling themselves up by the bootstraps to upgrade their profession in various ways.

Appearing before councilmanic bodies to urge legislation enforcing licensing and bonding and the eradication of unethical practices, they have shown the ability to police themselves and thus upgrade the electrical industry in general. There is no reason why they cannot expend similar effort to upgrade their understanding of the new materials and equipments now being marketed and thus erase the stigma of allegedly being "self-created paupers".

For instance, dimmer controls involving rectifiers are extremely small considering the loads they control, and they are applicable in about every circuit in a fine home. Installation of these, and their maintenance, require some real technical knowledge if they are to be sold to the architect, builder, or homeowner.

Yet the high margin profit on such specialty items warrants critical examination by the progressive contractor.

Inspectors are more insistant about meter-testing equipment like ground rod and insulation resistances and checking the ohmic value of grounding conductors on commercial wiring and controls that tie the system together at ground level. The time is near when the contractor will be required to make at least a minimum number of these tests. The man with the finest instruments made will err if he cannot interpret or realize the signifance of meter readings, and it may not be too long before such tests may be demanded at the conclusion of a housewiring job.

Becoming more technically competent is a satisfying end in itself. The South is becoming increasingly industrialized. More and more complex electronic controls are being demanded by industry, and there is no reason why a local job should be snagged by an out-of-the-area contractor because of incompetency on the part of local wiremen.

In this atomic age, it is a sure bet that the future holds promise of an infinite variety of more and more complex controls for the contractor to handle. So long as electrical men apply themselves to their study, they can "sell" new ideas to their customers. The new devices, and new methods, present both a challenge and an opportunity to contractors to upgrade themselves and the career they have chosen.

Marinating in ignorance of new items and new techniques only short circuits profits and paves the way to a mediocre business and the grim spectre of insolvency.

An old saw that still cuts is the truism: "The future belongs to those who prepare for it."

This is painfully true in today's and tomorrow's burgeoning electrical contracting business.

Ultrasonic cleaning

(Continued from page 76)

solder flux; photo and etch resists; pitch, tar, waxes; heat-treat scale, rust, or oxides; protein; graphite; inks; adhesives; paint; varnish; lacquer; fingerprints; shop dirt; preservatives; silicone oil or grease; metallic chips burned on carbon; dirty oil, soot, cement.

While it is true that very powerful ultrasonic radiation will break loose even chemically bonded contaminants, this is like going after a fly with an elephant gun. The best bet is to use the proper solution to break the chemical bond, and use the ultrasonic vibrations to accelerate the chemical reaction.

There are many chemicals on the market for use with ultrasonic cleaning. Some of them are standard industrial chemicals. Generally they fall into three classes: alkaline, acid, and solvent; selection will be governed by the particular requirement. Water itself, of course, is the most versatile and cheapest solvent. Detergents are added to the water to lower its surface tension. This makes it easier to form bubbles and decreases the amount of energy needed to do a cleaning job. Not all detergents are suitable, however. Some entrap air, and the dissolved gases reduce the transducer's efficiency by absorbing up to two-thirds of its energy while they are outgassing. This is also true of some chemicals used for treatment of ferrous and non-ferrous metals.

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(September 1959)

For some applications, "dry-cleaning" type solvents such as trichlorethylene and tricholrethane are used and sometimes alkaline cleaners, where heavy duty cleaning is required. To go beyond cleaning into etching or pickling, various acids are employed. In every case, ultrasonic action not only speeds up the operation, but, in general, the type of cleaning agent used in ultrasonic cleaning is much milder or more dilute than that used with conventional methods, thus economizing on chemicals.

There is a question of which solvent to use and also the correct working temperature. The wrong solvent will cause trouble and lead to disappointment. The most satisfactory, all-around solvent is trichlorethane, a quick drying, non-flammable, non-hazardous, non-residual type of solvent. Depending on the equipment and method used and, of course, the conditions of the meters, up to 50 meters can be cleaned with one charge or tankful of trichlorethane which sells for slightly more than two dollars per gallon.

Recommended procedures

Some operators find it is more economical to remove gross contaminants by degreasing the meters in tricholrethylene before putting them into the ultrasonic tank in order to delay solvent contamination in the final cleaning step. The best procedure depends on the design and construction of the meter, and the volume of work handled, but the heart of any ultrasonic cleaning system is the generator and the transducer tank plus the correct solvent.

The use of two one gallon capacity transducer tanks and the aid of L & R cleaning solution "No Foam" (L & R Equipment Co.) and Cigo-Sonic #2, (Chemical Industries, Inc.) gives generally excellent results on many types of registers.

Fill one tank with L & R "No Foam" and the other tank with Cigo-Sonic #2. First clean the register in the tank containing Cigo-Sonic #2. Here it degreases as well as cleans. Then immerse it into the tank containing L & R solution which brightens. Transfer the register back into the tank containing Cigo-Sonic #2 which now neutralizes the action of the L & R solution. Remove the register and allow to dry at room temperature for 2 minutes. The register will have a like-new appearance.

The time required is as follows: one minute in Cigo-Sonic #2 to clean; one minute in L & R to brighten and two minutes in Cigo-Sonic #2 to neutralize and clean. Registers and timing devices disassembled after the above stated processes show jewels as well as the pinions completely free from dirt or any other contaminants. It does not matter whether the registers or timing devices are made of brass, aluminum, or stainless steel.

Photographs

(Continued from page 43)

paper we sketch in the trough and connection nipples, and the other service equipment to be added.

We formerly made pencil drawings of existing services on a job and then in red crayon sketched in what was to be added. Occasionally there was a misunderstanding on the part of the mechanic, and he would have to call back into the office. This situation does not often present itself when the mechanic has a picture with a scale to check for anything he does not understand.

Estimating aid

Sometimes factors that a contractor may overlook turn up in a picture and have an influence on the estimate. Also, pictures kept on file of previous jobs many times help in designing a new installation.

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on a job. Showing a customer a picture of a neat installation similar to the one that will replace his present installation greatly influences his decision about having the job done.

Log industry

(Continued from page 39)

The debarker control panel, which was made up by Dixie Controls, Inc., of Birmingham, Ala., and the push-button panel has eleven operating controls for the debarker, chipper, slab conveyor system, and incline log deck.

Three other push-button control stations are used by the men who operate the equipment hooked up with this panel including headrig (5 controls and emergency stop), gangsaw (4 controls), and trimmer (4 controls).

On the opposite side of the mill the panel board carries lighting circuits, lumber transfer chain, slab transfer chain, jump skids to edger, edger by-pass, transfer to edger, out-feed rolls, jump skids, out-feed rolls to gangsaw, air compressor, trimmer, edger, timber jump skids, and edger dust transfer. At the edger there are seven push-button controls.

Maintenance and safety are also outstanding features of the electrical system at Winston Lumber Co. Motors that facilitate the gang saw, headrig, and compressor are mounted on concrete foundations on the ground level, where trucks can be driven to them when replacements are necessary. Motors for conveyors are mounted underneath the two-inch wood floor of the mill building.

Throughout the plant every foot of wire is in rigid conduit. Safety precautions are well conceived and carried out. There are emergency stops on saws, debarker, and chipper in addition to regular controls. There are no conduits or cables on the floor and none overhead except the conduits for three light circuits. These are fastened to the steel beams of the superstructure.

The log deck for the headrig has an automatic switch activated by logs as they reach the position at the headrig. In addition there are manual controls at each end of the chain conveyor of log deck.

Both panels in the plant are painted red and each box lettered as to the function of the circuit. It is standard practice that when any machinery is stopped for service or repairs the switch on the panel must be thrown after it is stopped by push button control.

The new lumber mill of Winston Lumber Company cost approximately $250,000. Of this cost the electrical wiring and control system represents better than ten per cent. Considering that five to six men can operate this mill as compared with 25 men used at the four widely scattered sawmills it replaces, the payroll savings alone go a long way toward justifying the investment. But on top of this there are income gains from waste savings, better lumber grades, and more efficient cutting of high cost logs.

Aluminum in homes

(Continued from page 41)

which are still in the developmental stage, are 96 inches long, with approximately 16 inches of exposed width. The panels are backed by a ½-inch plywood sheet, eliminating conventional

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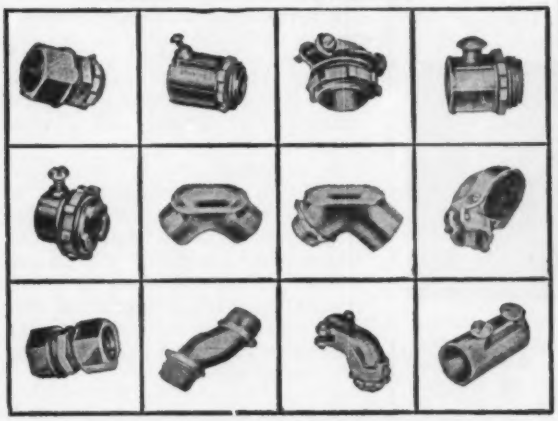

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pre-sheathing before application of the finished roofing. Aluminum nails secure the panels with special mastic-sealed aluminum battens at joint laps and panel ends. The panels on the Wheaton house are factory-painted with a pre-baked finish.

The soffit liner used on the Woodlark is a prototype of the material expected to be on the commercial market in the near future. The soffit material is in natural aluminum, diamond-embossed finish.

Extra labor involved in cutting a vent opening and inserting a louver for attic ventilation has been eliminated by louvers preformed in the end gable siding. These 11-inch side vent openings, which offer ventilation equal to conventional gable vent openings, are backed by an aluminum screen cloth.

Among the presently commercially available aluminum products used in the construction of this model home are exterior doors, door hardware, screens, sliding glass doors, frames and tracks, thresholds, windows, and combination storm doors.

According to the builder, use of aluminum residential products has been found to offer other advantages in addition to competitive cost. These advantages include the favorable weight-to-strength ratio, attractive appearance, and reductions in costs for installation, handling, and maintenance.

Insulation tests

(Continued from page 45)

Sudden decline in the insulation resistance warrants immediate investigation as to the cause and what dangers may develop if the rapid fall-off continues. Gradual, or so-called "normal" decline in insulation resistance may also result in final values that reduce the efficiency of a motor or other electrical equipment below economic levels, and so decrease the safety margin of insulation resistance that rupture and breakdown becomes imminent.

Many equipment manufacturers' manuals contain standards of insulation resistance for their equipment. If such data is not available, a safe standard for insulation of industrial equipment operating at low rates of current flow is one megohm at normal operating temperatures and humidities for each 1,000 operating volts or fraction thereof. If the resistance readings fall below this simple rule, equipment should be taken out of service and corrective steps initiated.

Resistance values

The figures below show minimum acceptable insulation resistance values for equipment or circuits operating at higher rates of current flow. These resistances apply to insulation between conductors, conductors to ground, and motor or generator connections to the frame.

Operating current in amperes	Minimum resistance in ohms
10	1,000,000
25	400,000
50	250,000
100	100,000
200	50,000
450 or higher	25,000

The following are some of the many classifications of equipment for which such record cards have proved their ability to save time and prevent service failures: wiring, switchgear, ignition harness, multi-conductor cables, motors and generators, circuit breakers, insulators, capacitors, meters, appliances, transformers, flooded equipment.

High voltage lab

(Continued from page 86)

can be countered by training courses planned to explain the over-all safety program and the reasons for certain safety procedures.

Even though every conceivable precaution is administered it is essential that a well-rounded safety program provide basic first aid instruction, especially the proper method of administering artificial respiration. Frequent practice sessions will assure that all personnel become proficient in this important life-saving technique.

Special meters

(Continued from page 78)

arranged in like manner as the kwh and kw meters as far as current and potential connections are concerned. The socket terminals of the graphic meters are arranged in order that a recording or indicating voltmeter or ammeter can be plugged in if desired.

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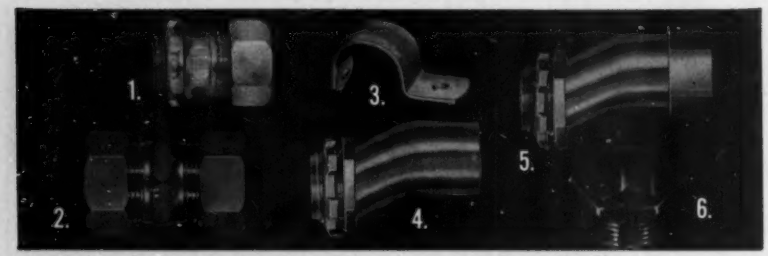

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where the new ideas come from

The weight of the entire analyzer, including mounting frame, meters and current transformer, is approximately 60 pounds. Thus it is easily transported and raised into position on the pole. It can be located at any convenient height and position on the pole as it is hung by a bracket at the rear of the top meter base, which fits over a second bracket attached to an adjustable chain clamp placed around the pole.

The data compiled from this unit is most helpful in determining the loading, consisting of maximum peak, time of maximum peak, duration of maximum peak, and power factor of the load, on a transformer serving a residential area, particularly where there may be large air conditioning loads.

The kwh registered by the analyzer shows a total of all residences served by the transformer under test, thereby setting a pattern for comparison, using billing department records of similar areas where there may be a question of transformer loading.

Substation circuit analyzer

The wide use of capacitors for economical operation, maintenance, and planning of distribution circuits has fostered the need for a simple quick method of circuit analysis. This need has been met by the combination of a 4W-3PH graphic kw meter and a ⅓ raised zero reactive kva graphic meter working as a unit, which has been found of great assistance in analyzing sub-station feeder circuits in our overhead distribution system.

The kw graphic meter and the reactive kva graphic meter are mounted back to back on a light weight tubular frame arranged in such manner as to be easily portable by one man.

As the demand for circuit analysis grew, a move was made to standardize all substation circuit metering equipment with test switches having color coded handles. At the same time rotation was also standardized at the test switch. With the analyzer test leads equipped with color coded current test jacks and color coded potential leads, the equipment proved to be exceptionally versatile with respect to being easily installed and maintained by personnel with limited experience and training.

This equipment has proved itself very useful for substation maintenance and planning crews for their capacitor bank installation and capacitor switching problems on distribution circuits leading from the substation.

This test equipment is also being used now by the electric meter department for customer load analysis for installation of kva demand meters, and the installation of capacitors for customers desiring to correct power factor conditions.

Another feature being found useful by the meter department is over-all checking of customer metering installations. This is done by the use of clamp-on current transformers on the customers service, which gives a comparison check relative to the customers meters and metering transformers.

From a customer relation standpoint, this method proves of value. The graphic charts give a written record to compare with any indicating instruments as observations are made while tests are being conducted.

High capacity metering

(Continued from page 84)

which increased the capacity of the MD-5 from 150 to 200 amperes, and the MD-7 from 150 to 175 amperes. The reinforcement is identical in both devices but, as pointed out previously in connection with meters, the same reinforcement gives less additional capacity in 4-wire than 3-wire.

Capacity is not the only criterion for the MD. As pointed out previously, many are needed and used for by-passing on lower capacity installations. The increased capacity of the MD simply made it applicable to wider range low load factor loads up to 200 ampere single-phase (matching the maximum single-phase service) and 175 ampere polyphase.

In 1958 the Type ML meter was introduced to replace the Type MH. As discussed previously this meter was designed to coordinate with the 100 and 200 ampere services—the Class 200 specifically to match the top capacity of the mounting devices. Generally the device needs to be of a capacity in the same order as that of the service installation.

Also in 1958, another step was made in high capacity meter mounting equipment, with the introduction of the Duncan Type HQ. The nomenclature "HQ" describes the features "High Capacity-Quick Operating." The HQ-5 is suitable for use on single-phase

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with a Duncan Type MK or on 3-wire 3-phase with a Type ML2S 2-element or equivalent meter; and the HQ-7 on 3-phase 4-wire with 2-element 4-wire delta meter such as ML2SΔ, or a 3-phase 4-wire wye, such as the ML2-1/2S or equivalent meter. Three element meters with round covers may be used in these devices. The HQ-7 may also be used with the 3-element meters having elongated covers by the use of a housing having a "split" cover.

This outline represents the progress to date on the application of high capacity self-contained meters. The savings per installation is quite nominal, based on figures obtained from some utilities — running on the average about $100 per installation. These small savings do, however, mount up to appreciable sums. In the approximately ten years since the introduction of the HD and other high capacity mounting devices, the Duncan Company, as one manufacturer, has not sold a great many such devices and those sold represent only a small percentage of the total installations—the number by actual count being only 237,000 devices to date. Applying, however, the estimated $100 saving per installation (many utilities insist it is more than $100 including labor) there will have been saved a total of $23,700,000. This is equivalent to the cost of a fair sized generating station—even at today's high cost, one with 150,000 kw of capacity. Including the total sales of the meter industry over this same period of time, we would expect the total saving to run something in the order of four times the above figure.

Line relocation

(Continued from page 95)

and estimate are then returned to highway general office with comments for approval or disapproval.

(4) Upon receipt in Atlanta of field review, force account agreements are prepared to cover the expense eligible for reimbursement by the highway department. After execution of the agreements they are forwarded to the Bureau of Public Roads for approval.

The field people have nothing to do with this general office handling of the force account agreement between the utilities and the Bureau of Roads.

(5) When construction is authorized, and after the Bureau of Public Roads' approval of the agreements, the utility owners are authorized to proceed with the removal and relocation of the facilities in conflict with construction.

On the five above procedures, we were directing our remarks for the most part to highway and utility engineers. Now, I am talking to *contractors* and *personnel* responsible for construction by state and the utilities.

(6) When construction is authorized, it is the responsibility of the contractor for the highway department, as provided by the plans and specifications, to arrange with the utility owner in cooperation with the resident or project engineer to coordinate the work to be performed by the utility owner and the highway contractor. This is necessary so that there will be no delay in the removal and relocation of the utility conflicts with highway construction under his contract.

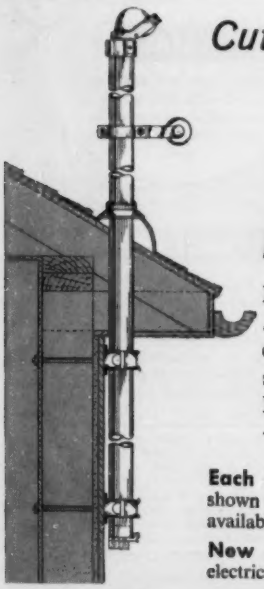
This is a very important provision of this established routine, and the agreement reached at this field meeting should result in the utility making only one move at the right time and to the right spot without holding up contract work.

Provisions for safe handling of work by all parties should be thoroughly discussed and proper precautions taken to insure safety to all parties as well as for preventing damages and interruptions to utility services.

Maintaining service

The electric utilities have a more difficult problem, we believe, than most of the other utilities in clearing road projects. In addition to the problem of maintaining electric service while facilities are being relocated, we are involved with a hazardous source of energy which, if not properly and carefully handled, may endanger the lives of our employees as well as the contractor's employees and the general public. Because of this hazard and the present-day need for continuity of service, the electric utilities need more time to plan and do the work, as well as closer joint cooperation with the contractor in the actual relocation work.

In order to keep service going and reduce hazards we often find



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it desirable to build a new line before dismantling the old one. This method is more expensive but is faster and safer. It does require very close cooperation between the utility and the contractor to handle the clearing work in this manner without causing a slow down of work by one or both parties.

At this point I would like to state that there is a definite need for the proper attitude of the contractor toward the utilities whose facilities must be cleared. It is true, also, that the utilities must have the right attitude toward the contractor. If I were a contractor and took over a job, I would like to have all outside owners of facilities remove all their conflicts and completely clear the area before I moved in to start the job. This would make it easier and less expensive to complete the project. Unfortunately, it is generally not practical for the utilities involved to completely clear out of the way.

Whatever service is being rendered must be continued and in most cases cannot be moved away from the project area. The contractor is urged to take the clearing work into consideration in his bids and plan to work and cooperate with the utilities.

On the other hand, the utility people also must have the right attitude toward the contractor. Road projects are usually nothing but a "pain in the neck" for the average utility engineer. This moving is just extra work for which no benefit will result. It is just relocating existing facilities under hazardous and bad working conditions.

Both the contractor and the utility people must realize that our present day civilization is bringing us closer and closer together, and almost our every move must take into consideration the other fellow. The other fellow believes he has a right at his location and naturally resents the necessity for changing it. Both the contractor and the utility must conform to the policy of "live and let live." A spirit of friendship and a determination to jointly solve all problems must be promoted and maintained for best results.

Some urban projects are highly complicated and quite often involve from four to eight classes of overhead conductors in addition to underground utilities such as power, communications, water, storm sewers, sanitary sewers, gas and others. From this situation it is seen that the contractor must deal with a very complicated clearing procedure and *must* have a tolerant and cooperative spirit to properly execute his contract.

In some of these more congested projects it has been found that it pays to get all the utility representatives together with highway personnel and go over the plans of the project. On these big congested projects it is absolutely necessary that all utility people have cross information as to each other's plans, particularly where underground facilities are involved. If each does not know of the other's intentions, he may plan to relocate his equipment to the same spot.

We have found it desirable in many instances for the utilities on expressway projects to have joint meetings to cross inform and coordinate plans.

We believe that the project engineer, with a little effort as a "middleman" or coordinator, can be the difference between smoothly and quickly handling this clearing work. The project engineer can keep in contact with all parties and help to schedule and "sandwich" utility relocations with contractor procedures so as to make it easier and quicker for all parties involved. The project engineer's role in helping to expedite utility clearing cannot be overemphasized.

In conclusion, I would like to say that liaison can be either friendly and cooperative or it may be forced. My plea to all of us who have to do with building highways is to make liaison a neighborly and cooperative undertaking. Let us all work together for the good of each other as well as for the good of the general public.

New tool device

(Continued from page 98)

joints made with a hot line clamp, which it replaces. The motions and actions of a lineman using a hot line stick to install a clamp with aid of the new tool, are essentially similar to those involved in installing the conventional hot line clamp. As a result, no extensive retraining is involved in introducing the tool for use by a utility.

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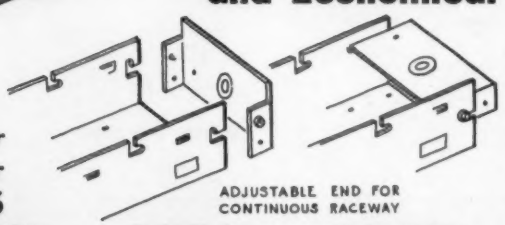

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